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The issuance of this publication approved in accordance with NAVEXOS P-35.

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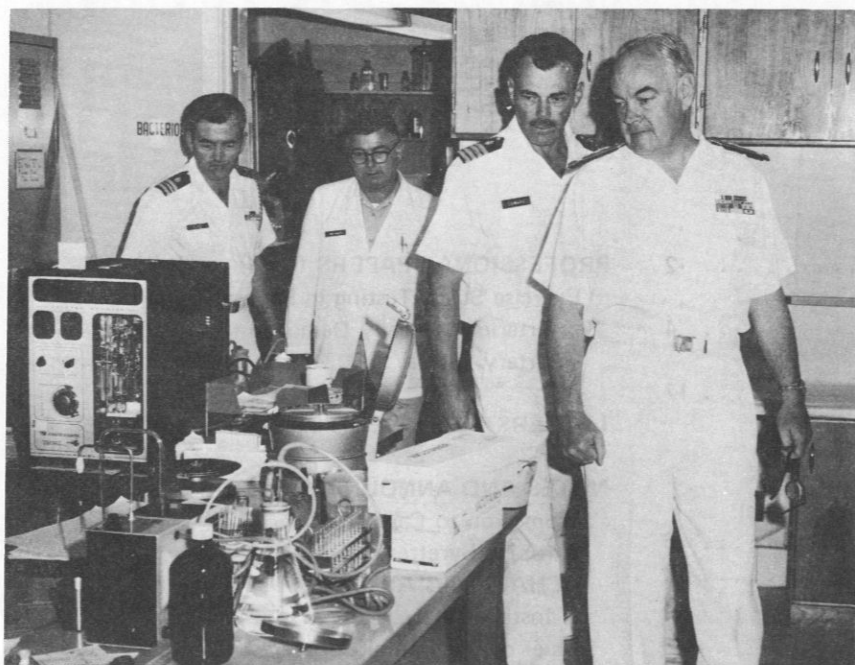
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Credits: All pictures are Official U.S. Navy Photographs unless otherwise indicated.

Our cover photograph reveals two MSC officers hard at work. For further details, see page 32.

Photo on page 2 was taken during a recent visit of the Surgeon General to the Naval Hospital at Port Hueneme, Calif. Pictured during a tour of the clinical laboratory are (from left to right): LCDR J.R. Erie, MSC, USN who accompanied the Surgeon General; HMC B.H. Raley, Leading Chief, Laboratory Service; CAPT E.C. Cowart, Jr., MC, USN, CO Nav Hosp Port Hueneme; and VADM G.M. Davis, MC, USN, Surgeon General.

The continued support of Ms. S.B. Hannan, BUMED Code 2133, and the Illustration and Exhibits and Photography Divisions of the Medical Graphic Arts Dept., Naval Medical Training Institute (formerly Naval Medical School), NNMC, Bethesda, Md., is gratefully acknowledged.



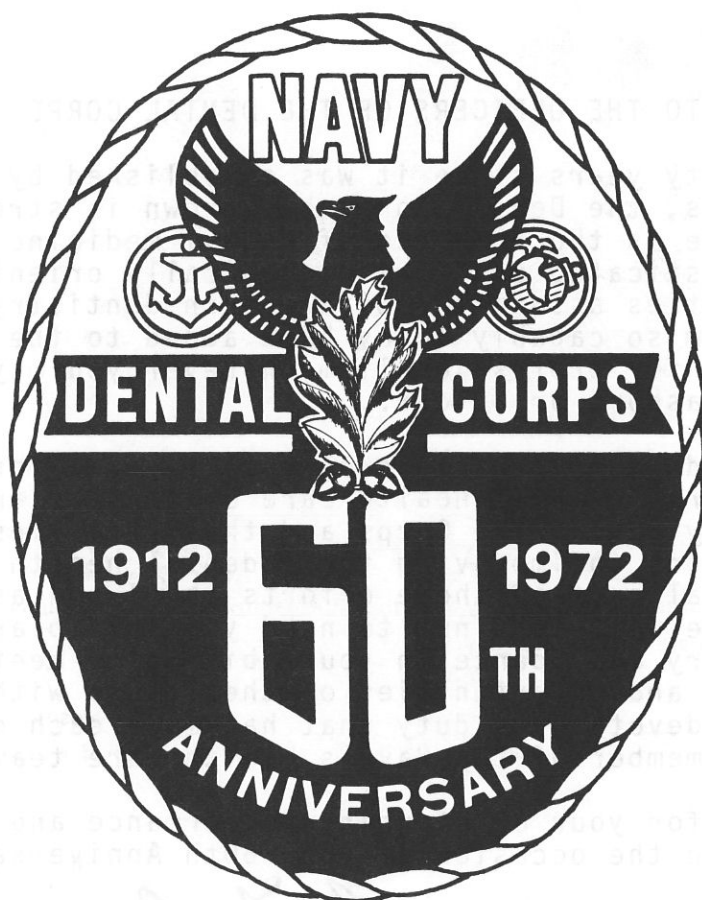
from the Chief

In tracing the historical growth and development of the Navy Medical Department from 1776 to the present time, it soon becomes apparent that the month of August is uniquely propitious. During this month we commemorate the 25th anniversary of the Medical Service Corps on the fourth day of the month, the 60th anniversary of the Dental Corps on the 22nd day, and the 130th anniversary of the Bureau of Medicine and Surgery on the 31st day.

Each of these integral parts of Navy Medicine has grown and prospered since its inception. Each has played a vital role in meeting the challenge of rendering medical support to our forces afloat and ashore.

As we look ahead to the future, it is equally clear that our medical support must become ever more responsive to the men and women whom we serve. With the continued and harmonious endeavor which has characterized our Medical Department in recent years, I am confident that we shall be equal to the task.







THE SURGEON GENERAL OF THE NAVY
WASHINGTON

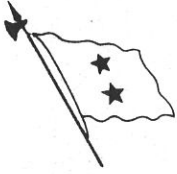
TO THE OFFICERS OF THE DENTAL CORPS

In the sixty years since it was established by an Act of Congress, the Dental Corps has grown in strength and stature as the practice of dental medicine became more sophisticated and more biologically oriented. The complex duties associated with modern dentistry that you perform so capably today have added to the Corps' reputation for professionalism wherever you may be serving - ashore or afloat.

We have made considerable progress in our efforts to provide for the total health care of the men and women of the Navy and Marine Corps and their families. Your contributions to improving their dental health have been a vital part of these efforts and I can assure you that we will continue to need your exemplary support. I have every confidence in your ability to meet the challenges and opportunities of the future with the same skill and devotion to duty that has made each of you an important member of the Navy's health care team.

Thank you for your outstanding performance and Happy Birthday on the occasion of your 60th Anniversary.

G. M. DAVIS
Vice Admiral, MC,USN



DEPARTMENT OF THE NAVY
ASSISTANT CHIEF OF THE BUREAU OF MEDICINE AND SURGERY (DENTISTRY)
AND
CHIEF OF THE DENTAL DIVISION
WASHINGTON, D. C. 20390

SIXTIETH ANNIVERSARY OF THE
NAVAL DENTAL CORPS

22 August 1972


To all Naval Dental Corps officers, I extend hearty congratulations on this the Sixtieth Anniversary of the Naval Dental Corps.

Your enthusiasm and professionalism in providing dental health care to the Navy and Marine Corps have won you the warm respect of all whom you serve.

In the past year, many of our goals have been met, others remain to be achieved. New concepts of dental health care delivery are being explored and will be a challenge to our imaginations and ingenuity. In our every action, the watchword of our labor must be better care for those in our charge.

Let us go forward together to carry on the high traditions of the past.

Happy Birthday!


J. P. ARTHUR
Rear Admiral, DC, USN

Sixtieth Anniversary of the U. S. Naval Dental Corps

"Ten More Years of Progress"

Sixty years ago on August 22, 1912, the Naval Dental Corps was established by the 62nd Congress. It authorized the appointment of not more than 30 acting assistant dental surgeons. Today there are 1,880 regular and Reserve dental officers on active duty throughout the world. These officers are engaged in a well-balanced program of clinical services, training and research. The branding iron of time has changed the Navy in many ways. However, the mission of the Dental Corps remains constant — to provide the best dental care possible to the men and women of the United States Navy and Marine Corps.

Notable contributions were made during the past decade in establishing vigorous and dynamic preventive dentistry programs, modernization of dental facilities, expanded educational opportunities and dental research.

The Years 1962-1972

The Dental Corps' treatment programs were under constant study and many changes were implemented to improve and increase the delivery of dental health care. Considerable attention was directed toward the problems of recruit care and the professional needs of units in Vietnam. Dental personnel voluntarily participated in the Civic Action Program in Vietnam by providing humanitarian treatment to Vietnamese civilians. Dependent dental care was provided at

activities outside the United States and at installations designated within the United States which have inadequate civilian facilities available. Preventive Dentistry programs were implemented for eligible dependents at all facilities. Subject to the availability of space and the capabilities of the professional staff, dental care was also provided to retired Navy and Marine Corps personnel.

During this period, a comprehensive Preventive Dentistry Program encompassing procedures aimed at preventing both dental caries and periodontal disease was developed. Research, which was underway in 1962, documented the cariostatic effectiveness of stannous fluoride when applied topically to the teeth. Based upon the findings of these studies, the well known three-agent stannous fluoride treatment program was initiated and the goal of providing this treatment annually for all active duty personnel has been achieved.

By 1969, the Naval Dental Corps' leadership in the field of preventive dentistry was recognized throughout the profession. With programs for prevention of dental caries well established, attention was focused upon preventing and controlling periodontal disease. In recognition of the relationship between dental caries, periodontal disease, and bacterial plaque, the Navy Plaque Control Program has been implemented and the recently initiated Navy Periodontal Screening Examination Program provides for the early recognition and prompt treatment of periodontal disease. The current

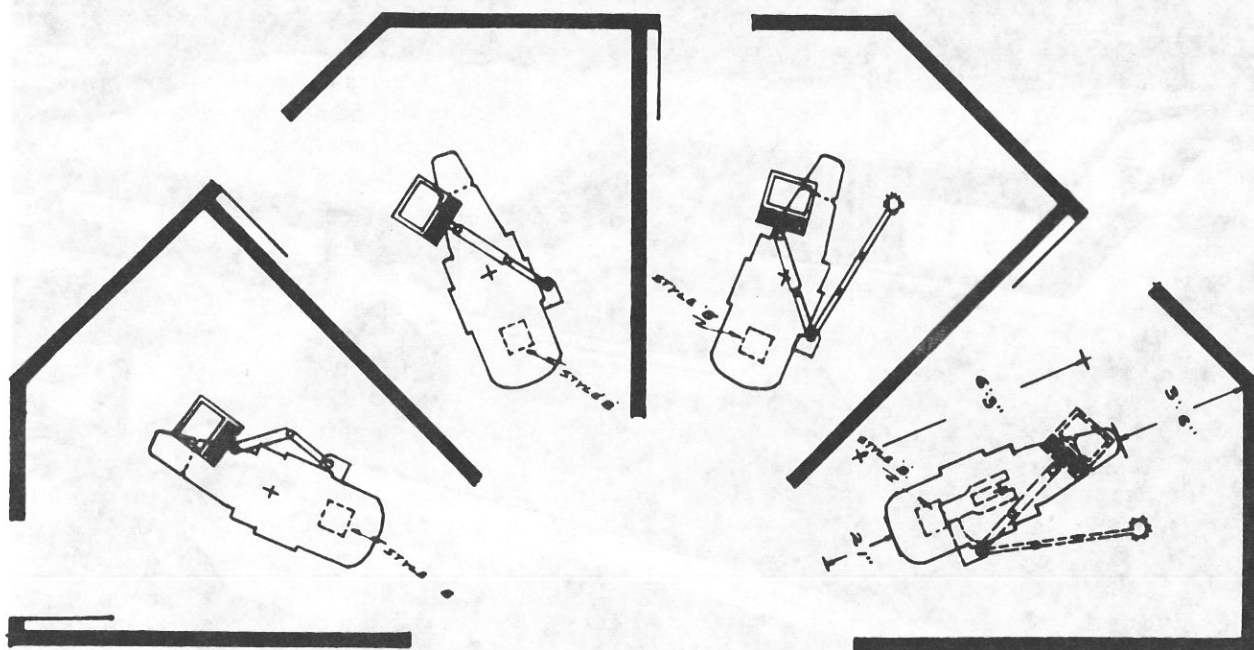
treatment programs include preventive as well as restorative dental care.

For the first time since its inception in 1957, the validity of the dental company concept was tested in combat in Vietnam. In providing dental support to the U.S. Marine Corps, the dental company proved itself to be a highly flexible, effective, and productive combat support element. At the height of the conflict in Southeast Asia three dental companies with a total of 42 dental officers and 780 dental technicians were attached to Marine Corps commands in Vietnam. The dental personnel provided treatment to the Marines, assisted their medical colleagues with the treatment of casualties, particularly when there were a large number of wounded, and participated in the Civic Action Program. The Fleet and Marine Corps Medical/Dental Support Division established in the Bureau of Medicine and Surgery has contributed to the improvement of the dental health of the Fleet Marine Forces, naval forces afloat and the supporting establishments.

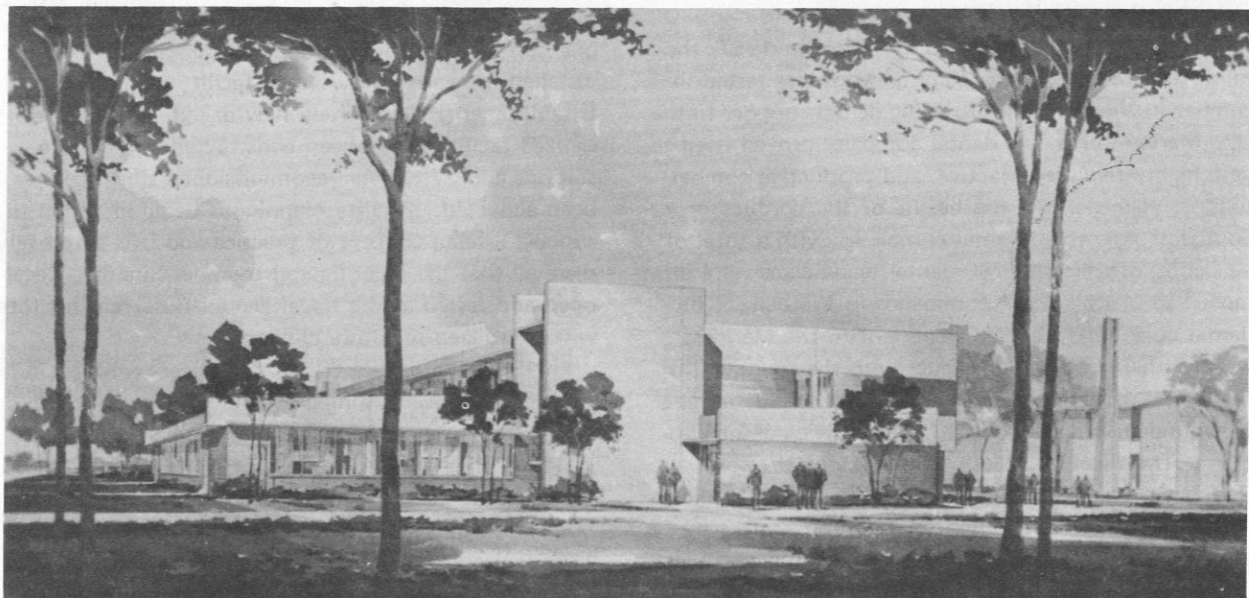
Well-trained dental officers, utilizing modern facilities, equipment, supplies, and practice concepts, continued to deliver the highest level of professional care. At the time of the 50th Anniversary, 321 dental facilities were providing treatment, of which 119 were ships. At the present time, dental service is available at 325 facilities including 84 ships.

As a result of the implementation of the Equipment Modernization Program, equipment designed to carry out current concepts of modern practice has been installed in nearly every dental facility in the Naval Establishment. Completely new or extensively modernized facilities have been constructed at 27 shore stations and 27 new or recommissioned ships have been activated. Facility planning is being modified to support a team concept of practice and it is tentatively planned that the reconfigured treatment module developed and tested at the Naval Dental Research Institute will be utilized in future clinic designs.

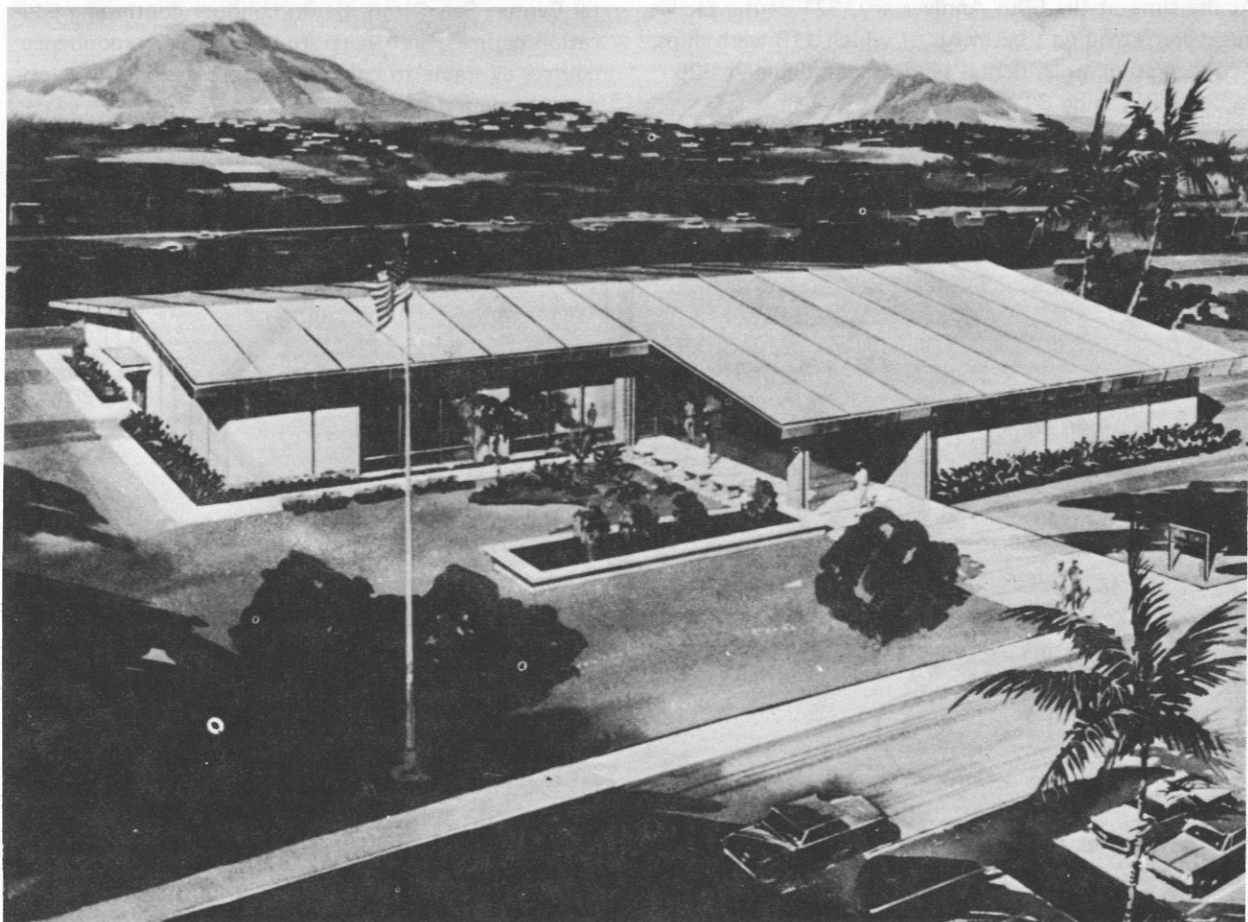
In 1962, there were 69 dental officers enrolled in full-time advanced training programs. One hundred and fifty officers were assigned to advanced training in 1972. The gradual increase of training opportunities over the past ten years has made it possible for 86 percent of all career officers to complete from one to four years of graduate study. The Naval Dental Corps is also approaching its goal of assigning each dental officer to one continuing education course or professional meeting annually. Both the Naval Graduate Dental School, Bethesda, Md., and the Naval Dental Center, San Diego, Calif., conduct continuing education courses, and there are now 16 correspondence courses available to enhance the professional development of dental officers.



It is tentatively planned that a four room dental operating module, designed to accommodate modern concepts of dental practice, will be utilized in clinics constructed in the future. The dentist may use a single room or expand to two, three, or four rooms.



The Naval Dental Clinic, Pearl Harbor, Hawaii and the Naval Dental Clinic, Los Angeles - Long Beach, Calif., are two of the Navy's newest facilities. Each contains 40 dental treatment rooms, a preventive dentistry suite and a dental prosthetic laboratory.



The Naval Graduate Dental School and The George Washington University entered into an agreement in July 1971, whereby the University offers a program leading to the degree of Master of Science in Special Studies (Oral Biology) for courses conducted at the Dental School.

The Postdoctoral Fellowship Program initiated in 1964 continues to provide dental officers, at all stages of a naval career, an opportunity to improve their professional capabilities in the various specialties.

The inception of the Navy Dental Scholarship Program in 1971 is regarded as a significant milestone in the Dental Corps' history. This program, which provides a full four-year scholarship and officer's pay and allowances, guarantees the procurement of highly qualified young career officers.

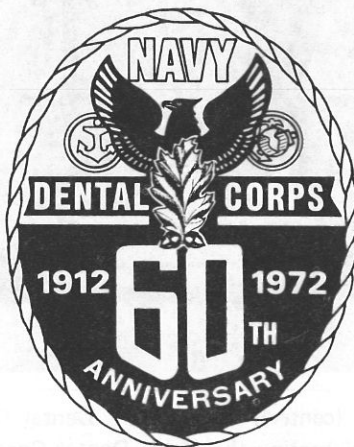
The objectives of Navy dental research were directed toward developing dental health programs to support specific operational requirements, to provide applied or clinical research support to the patient-care programs and to conduct basic research studies to support the clinical or applied sciences. In 1962, there were 26 active subtasks including "Bacteriological Studies of Saliva and Dental Plaque" and "The Greater Utilization of Dental Technicians." An extensive series of clinical studies of the cariostatic effectiveness of stannous fluoride were conducted at the Naval Submarine Medical Center, New London, Conn. The management of osseous defects was also an important area of investigation. There are presently 46 research work units active under the Dental Research Program. These studies are being conducted primarily at the Naval Dental Research Institute, Great Lakes, Ill., and the

Naval Medical Research Institute, Bethesda, Md. The most significant studies include the relationship of dental caries and Streptococci, plaque and its relationship to periodontal disease and dental caries, the treatment of maxillofacial injuries, facility design, and behavioral studies. The Office of Naval Research continues to sponsor the Extramural Dental Research Program. The purpose of this program is to improve Navy dentistry by supporting research projects related to naval problems at universities and other non-profit institutions.

The Naval Dental Corps maintained a strong and viable Naval Reserve Force composed of approximately 3,000 dental officers on inactive duty who are available to augment the Regular Navy Dental Corps in the event of mobilization. Many of the officers are affiliated with Reserve dental companies. Naval Reserve Dental Company 3-4, of New York, received the first Outstanding Naval Reserve Dental Company Award for their contributory support to the active forces. Dental Students commissioned in the U.S. Naval Reserve were assigned to the Indoctrination Course at the Naval Officer Training Center, Newport, R.I., and to Clerkship Training.

Future Goals

The many notable accomplishments of the past are a true reflection of the ambition, imagination, resourcefulness and progressive thinking of the Corps' previous leaders and individual members. With the momentum for progress well established, our present collective efforts will make possible even greater contributions to further improve the dental health of those whom we are privileged to serve. 🇺🇸



ONE YEAR AGO.....

In USS Intrepid [CVS-11]



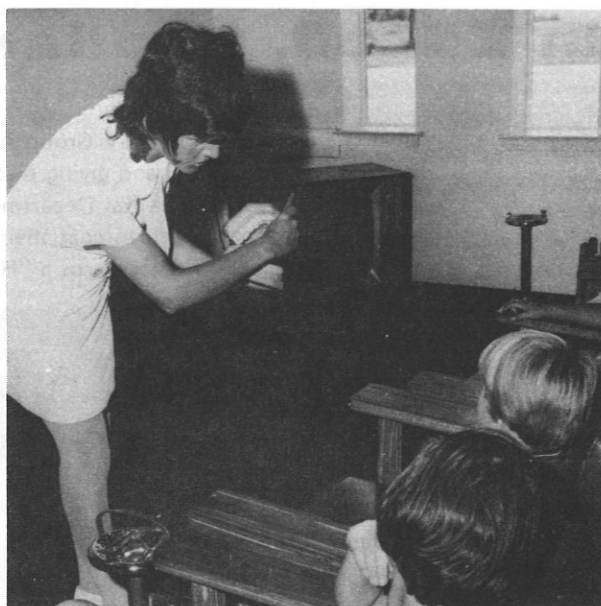
CAPT Roger H. Flagg (center), INTREPID's Dental Department Officer cut the cake on the mess decks, celebrating the Naval Dental Corps' 59th birthday. Looking on are RADM George P. Steele (left), Commander Antisubmarine Warfare Group Four; CAPT Charles S. Williams, Commanding Officer (right), and the officers and men of the Dental Dept. (Photo by PH3 J. Bowers)

In Gulfport, Mississippi

The Dental Department of the Naval Construction Battalion Center in Gulfport, Miss., eliminated sweets from the Birthday celebration for the Navy Dental Corps. A three-day stannous fluoride program for dependent children was in effect, and all the 160 children received an apple on the Birthday. For adults, a watermelon-cutting ceremony was substituted for the traditional cake-cutting. It went something like this:



Mothers and children assembled in waiting area, by appointment, for dental exam.



Instructions as usual



Dental Examination



CDR Eugene A. Watkins, DC, USN (extreme right) shared the watermelon cutting with CAPT W.M. Zobel (2nd from right). Taking part in the ceremony were, from left to right: DTC Fred Street, PT3 Gary Jenner, receptionist Janie Lee, dental hygienist Mary Coyro, and DT3 Byron Collins.

In Edzell, Scotland

At the U.S. Naval Security Group Activity in Edzell, Scotland, it was business as usual. After treating and giving plaque control instructions to their afternoon patients, however, the Dental Department was joined by the Medical Department and other base personnel, to coat their teeth with purple frosting (dental academic color) and wish the Dental Corps a "Happy Birthday."



LCDR David L. Drake, DC, USN, proudly produced the commemorative cake (baked of course by Mrs. Drake).



DN D.A. Smiley (right) assisted as "the youngest" during the cutting of the cake.



Mrs. Mary Walker (foreground), a Registered Nurse in the Medical Dispensary, and DT2 D.E. Hritz, USN (extreme right) were among the participants.

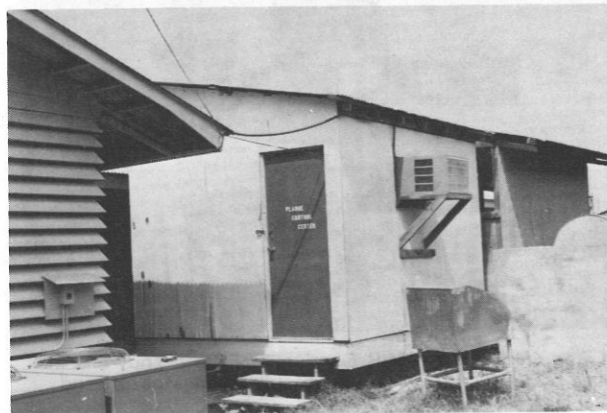
Plaque Control Program in the Delta

By LT Raymond A. Yukna, DC, USN,* Naval Support Activity
Detachment, Binh Thuy, Republic of Vietnam.

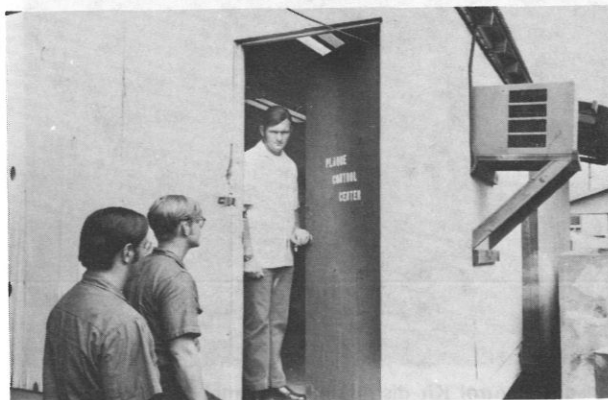
With the discovery that bacterial plaque is the causative agent of both caries and gum disease, dentists the world over have sought ways to prevent, eliminate, or remove this harmful material. Scientists are working on vaccines, mouthwashes, and toothpastes that will prevent plaque formation; but the only way we now have of controlling bacterial plaque is to physically rub it off of the teeth after it forms.

The Navy has led the way in developing a comprehensive, workable plaque control program for all of its personnel — age, rank, and duty station notwithstanding. BUMEDINST. 6600.6 of March 1971, outlines the basis, principles, and objectives of the Navy Plaque Control Program; and contains scoring systems for indicating the severity of dental disease and the amount of bacterial plaque present at any given time.

Plaque control entails the daily physical removal, with toothbrush *and* dental floss, of all of the bacterial plaque that has accumulated on the teeth within the last 24 hours. Bacterial (or dental) plaque is a soft sticky film constantly being formed by oral bacteria, that adheres to the teeth especially along the gum line and in between the teeth. Since plaque is transparent and invisible, it can only be detected with disclosing agents, such as the red tablets or liquid dye commonly



Plaque Control Center "hooch" behind the dispensary and dental clinic, NSAD Binh Thuy, RVN. The Center contains a large sink with mirrors, dental chair, and prophylaxis unit.



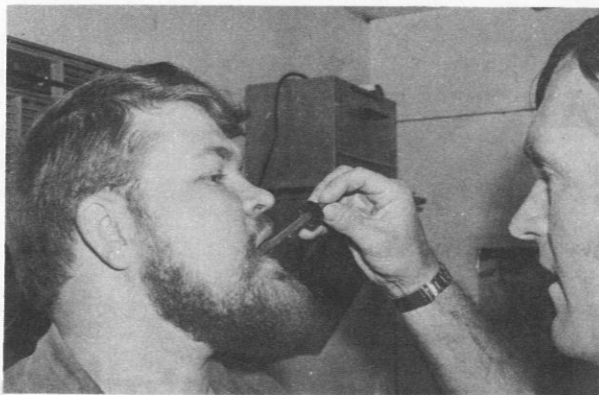
DTG1 Thompson greets one of his Plaque Control classes.

*Since May 1972, LT Yukna has been attending the Naval Graduate Dental School, NNMCC, Bethesda, Md.

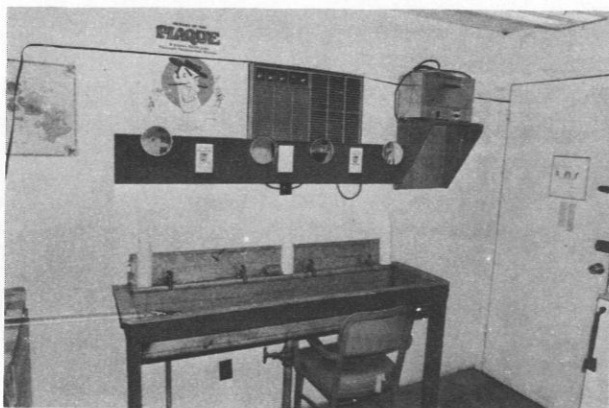
The opinions expressed herein are those of the author and cannot necessarily be construed as reflecting the views of the Navy Department or of the naval service at large.

used in dental clinics and by the patients themselves, at home or in the barracks. Once the presence of plaque is visualized, patients can effectively practice cleaning of involved areas.

The Plaque Control Program (PCP) as developed by Drs. Edward Bruce and Raymond Yukna at NSAD Binh Thuy, for Navy personnel in the Delta region of Vietnam, works like this. The patient is first examined at dental sick call to determine all of his dental needs. If decay or periodontal disease is found and/or disclosing solution reveals a high plaque score (NPI or Navy Plaque Index), the problem is explained to the patient with emphasis placed on the role that plaque plays in diseases found in the mouth. Items needed for plaque control are demonstrated, reading material that further explains about plaque is provided, and the member is enrolled in the Plaque Control Program. Only his emergency problems are



DTG1 Thompson applies disclosing solution.



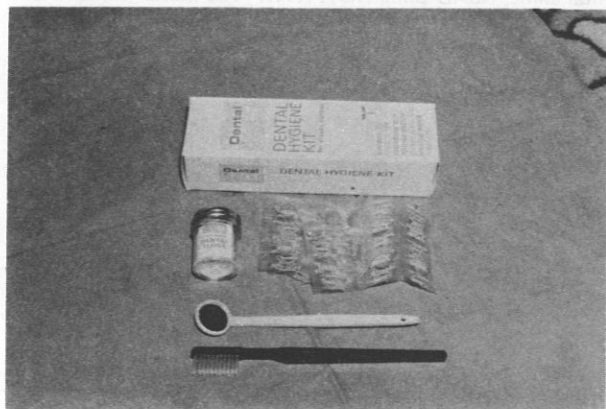
Large sink built by M&R Division, LSB Binh Thuy and installed by CMBU-302. Note adjustable shaving mirrors and visual aids.



Group gathers around the dental chair to view the red-stained plaque in situ. Patient in the chair views his own situation with hand mirror.

treated at this time, pending successful completion of the control program.

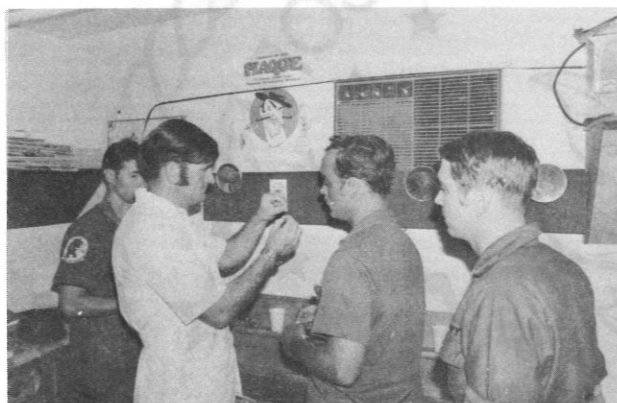
The PCP itself is a five-day, Monday through Friday regimen consisting of daily visits, of about 15 minutes each, to the Plaque Control Center manned by DTG1 Robert Thompson. On Monday, classes consisting of one to six persons gather in the Plaque Control Center, at one of two appointed times, to begin their program. Each patient brings with him the necessary tools for plaque control — soft toothbrush, dental floss, dental mirror, and disclosing tablets (available in kit form from the dental department). The group is made aware of current scientific evidence concerning bacterial plaque, how it relates to their dental problems, and what daily plaque control can accomplish in the way of improved dental health.



Plaque Control Kit distributed by dental department includes soft toothbrush, dental floss, dental mirror, disclosing tablets and instructions.



The patients brush their teeth without toothpaste at the sink, watching in the mirrors to make sure they reach all of red-stained areas.



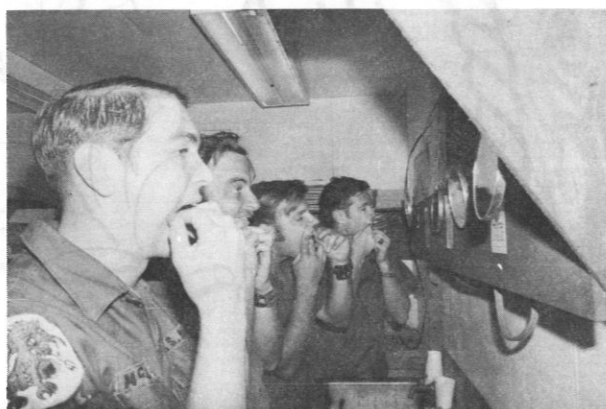
Proper floss technique is demonstrated by DTG1 Thompson.

Each patient is then "disclosed" to determine his starting NPI and indicate where in his own mouth there is evidence of inadequate plaque removal, how to clean these areas, and how to use dental floss. Each patient then brushes and flosses his teeth, under supervision, until all of the plaque is removed. The same procedures are repeated on Tuesday and Wednesday, with NPI scores being recorded each day.

On Wednesday the patients are told not to clean their teeth at all until the next session. When they arrive on Thursday, they perform their oral hygiene first, while being observed and supervised by the dental technician. Subsequently they are disclosed and scored to determine if they are still failing to remove all plaque. This change in routine is repeated on Friday. It is the very rare patient who has not learned by the fifth day how to completely clean his teeth and get his NPI down near zero.

The patients then bring their completed PCP sheets to the main clinic where appointments are made for prophylaxis, restorative, and other necessary treatment. The NPI and gingival health are checked at each appointment by Drs. Bruce and Yukna to make sure that vigilant plaque control is maintained, and to correct any remaining minor deficiencies in technique.

The benefits of our program are obvious to us and to most of our patients. In fact, many patients now come to the clinic asking about "this plaque control thing." The main benefit is rather long-range, but scientific evidence has shown that mouths freed of bacterial plaque, on a daily basis, will not acquire tooth decay or periodontal disease. Plaque control is in fact the first step in the treatment of these diseases, and will improve the dental health of all Navy personnel. The trick is to get our members to do the job, faithfully and conscientiously.



The patients practice their floss technique at the sink, looking in the mirrors to aid in achieving dexterity and thoroughness.



Vietnamese assistant Pham Thi Mai demonstrates the use of dental floss to two other civilian employees.





THE SECRETARY OF THE NAVY
WASHINGTON

TO THE OFFICERS OF THE MEDICAL SERVICE CORPS

It is with great pleasure that I offer my personal congratulations to all officers of the Medical Service Corps on this Twenty-Fifth Anniversary of the establishment of the Corps.

The contributions made by the many talented officers that comprise your Corps are most certainly well recognized throughout the Navy. Each member of our Navy Community depends on these material contributions, both for themselves and their families, for the maintenance of health. Medical Service Corps officers have earned a reputation for high achievements in all of the diverse specialties allied to medicine and dentistry. I commend you for your past performance and I am confident that new and greater challenges in the future will be met with the same untiring efforts, deep devotion to duty, and extreme pride in the results.

I wish to take this opportunity to offer my sincere best wishes to each of you for continued success in your present and future assignments.


JOHN W. WARNER



CHIEF OF NAVAL OPERATIONS

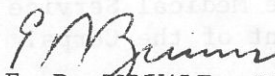
TO THE OFFICERS OF THE MEDICAL SERVICE CORPS

I offer each of you my congratulations and sincere best wishes on this happy occasion of the Twenty-Fifth Anniversary of the establishment of the Medical Service Corps.

The officers of the Medical Service Corps have made many outstanding contributions to health care delivery in the past; however, you cannot rest on your laurels in the Navy

of the future. The ever expanding health care needs require even greater services from the members of your Corps. You can take just pride for the many successes that transpired in reaching this Silver Anniversary; however, it is the future that must receive your every attention. I am confident that you will continue to meet new challenges as they appear and it is for this that I would like to commend each of you.

Again, congratulations and best wishes for continued success in the future.



E. R. ZUMWALT, JR.
Admiral, U. S. Navy



1 June 1972

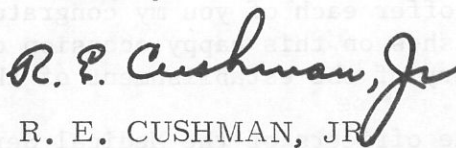
Dear Captain Van Landingham:

Congratulations to you and all members of the Medical Service Corps as your organization observes the 25th anniversary of its founding on August 4th.

Your Corps is an invaluable component of the Medical Department of the Navy, complementing as it does the functions of the Medical and Dental Corps. All members can take great pride in the twenty-five years of outstanding service rendered Navy and Marine Corps personnel and their families.

Again, congratulations and best wishes to All Hands!

Sincerely,



R. E. CUSHMAN, JR.
General, U. S. Marine Corps
Commandant of the Marine Corps



THE SURGEON GENERAL OF THE NAVY
WASHINGTON

TO THE OFFICERS OF THE MEDICAL SERVICE CORPS

My warmest personal greeting to each of you upon the occasion of the Silver Anniversary of the establishment of the Medical Service Corps.

As we strive to meet the demands of the future on the Medical Department, the contribution of the members of the Medical Service Corps will become even more important. I thank you for your many previous accomplishments and I know you will continue to uphold your well deserved reputation for quality achievements and "can do" spirit. It is only with your contribution to the total team effort that we will be able to fulfill the mission of the Medical Department in the future. I truly feel that the officers of the Medical Service Corps will meet all new challenges successfully and that each of you will continue to serve with extreme loyalty and devotion to duty.

Congratulations to each of you and best wishes for a HAPPY BIRTHDAY!

G. M. DAVIS
Vice Admiral, MC, USN



DEPARTMENT OF THE NAVY
ASSISTANT CHIEF OF THE BUREAU OF MEDICINE AND SURGERY (DENTISTRY)
AND
CHIEF OF THE DENTAL DIVISION
WASHINGTON, D. C. 20390

2 August 1972

TO THE OFFICERS OF THE MEDICAL SERVICE CORPS

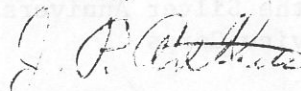
It is with great pleasure that I extend congratulations to all of you on this Silver Anniversary of the Navy Medical Service Corps.

Your corps of officers has earned an enviable reputation for dedication to duty and pride of service during the past 25

years, and the accomplishments of the Navy Medical Department were greatly enhanced by your loyal support and assistance. I am particularly appreciative of the many contributions made by Medical Service Corps officers to the Naval Dental Corps. I am looking forward to a continued successful association on our Navy Health Care Delivery Team.

Best wishes from the officers of the Naval Dental Corps for a Happy Birthday,

Sincerely,



J. P. ARTHUR
Rear Admiral, DC, USN



DEPARTMENT OF THE NAVY

BUREAU OF MEDICINE AND SURGERY

WASHINGTON, D.C. 20390

TO THE OFFICERS OF THE MEDICAL SERVICE CORPS

It is a pleasure to recognize the Twenty-fifth Anniversary of the establishment of the Navy Medical Service Corps and to send our heartiest congratulations on this historic occasion.

Throughout the history of the Medical Service Corps, its members have given the world an example of persistent purpose together with extraordinary dedication, loyalty and ambition. Your officers have contributed generously, nationally and internationally, to the delivery of quality health care.

The administrative support and cooperation received by Nurse Corps officers from Medical Service Corps officers are deeply appreciated.

Nurse Corps officers throughout the world are proud to salute the Medical Service Corps and to extend best wishes for continued success.



ALENE B. DUERK
Rear Admiral, NC, USN
Director, Navy Nurse Corps



DEPARTMENT OF THE NAVY
CHIEF OF THE MEDICAL SERVICE CORPS
BUREAU OF MEDICINE AND SURGERY
WASHINGTON, D. C. 20390



HAPPY SILVER ANNIVERSARY

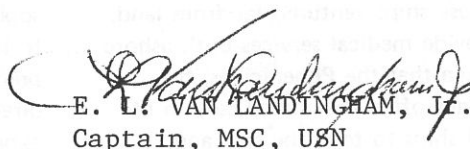
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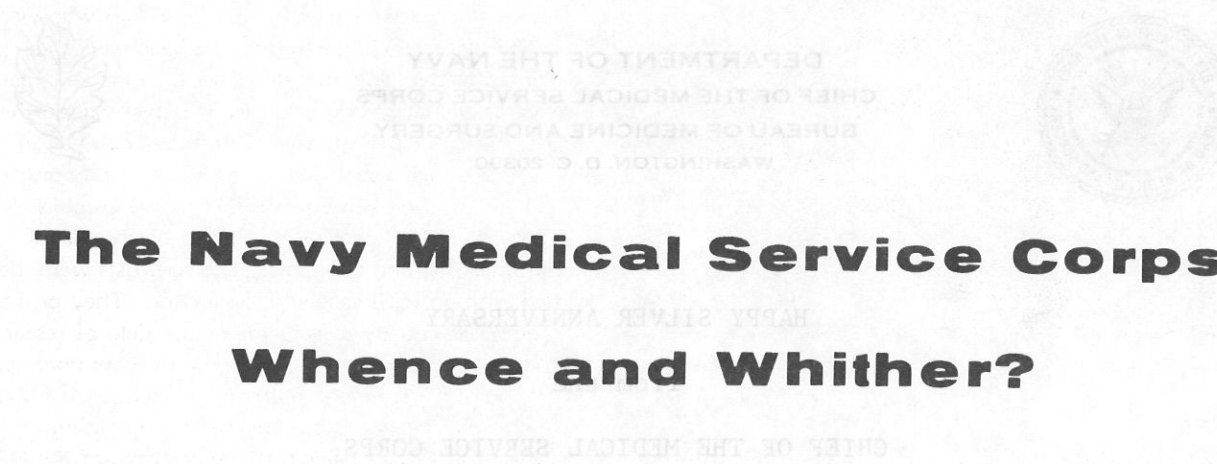
CHIEF OF THE MEDICAL SERVICE CORPS

It is with pride and pleasure that I congratulate each of you as we reach the Twenty-Fifth Anniversary of our Corps.

The quarter century that is now behind leaves us with a true sense of many successful accomplishments in the delivery of health care services. We can all be proud of these accomplishments since they were the collective efforts of all the present and former members of our Corps. The record of our past successes will give us the necessary confidence for meeting the requirements of the future. It is toward the future that we must channel our efforts if we are to maintain our high standards of service. We must continue to meet each challenge with enthusiasm and make each approach to our new problems a positive one. The entire Navy Community will continue to rely on the service provided by the diverse talents within our Corps and I am confident that we will meet each new challenge successfully.

May the next year be rewarding for each of you and HAPPY BIRTHDAY!


E. L. VAN LANNINGHAM, JR.
Captain, MSC, USN



The Navy Medical Service Corps

Whence and Whither?

By LCDR James R. Erie, MSC, USN,* Bureau
of Medicine and Surgery, Washington, D.C.

The Medical Service Corps was formally established by the Army-Navy Medical Service Corps Act of 1947. This Act became Public Law 337 of the 80th Congress when it was signed by President Truman on 4 August 1947, but the organization which it formalized had been in existence for many years before. On the occasion of the 25th Anniversary of the Medical Service Corps, it seems appropriate to briefly review some of the history that resulted in the passage of the legislation which produced a new staff corps in the Navy, and to offer one officer's opinion concerning the future of the Corps. The author is indebted to LT W.K. Patton, MSC, USN, (Ret.), BUMED historian, for much of the information contained in this article.

Medical care for the men who follow the sea was not a new concept even 2000 years ago. The ancient seafaring nations, whose ships ventured far from land, were equipped to provide medical services both ashore and afloat. It is known that the Phoenicians, the Greeks, and the Romans often designated certain of their ships as hospital ships to tend the sick and

wounded and the larger ships often carried one or more medical practitioners and assistants. As the centuries passed it became the custom to keep records on the seamen who received treatment; this record-keeping practice slowly evolved into one that included records of medical supplies and equipment.

In the early days of the United States Navy these records were generally kept by the ship's physician personally. But, towards the end of the nineteenth century as steam replaced sail, the ships became larger with bigger crews, more capable of staying at sea for extended periods of time. This fact, coupled with the progress that was being made in the practice of medicine at a steadily accelerating rate, had a definite impact on the naval medical officer. He had more people to take care of and he had to do so in a more sophisticated manner. He often had very little time to keep proper records on his patients and there was practically no time at all for maintaining records not directly related to the treatment he provided. He also experienced considerable difficulty in properly supervising the efforts of his assistants. He could have used a good Medical Service Corps officer, but none were available.

Even though its birth occurred some 49 years later, the Medical Service Corps was conceived with the passage of the 17 June 1898 Act of Congress that

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The opinions expressed herein are those of the author and cannot be construed as reflecting views of the Navy Department or of the naval service at large.



LT James D. Ford, MSC, USNR — a Pharmacist.

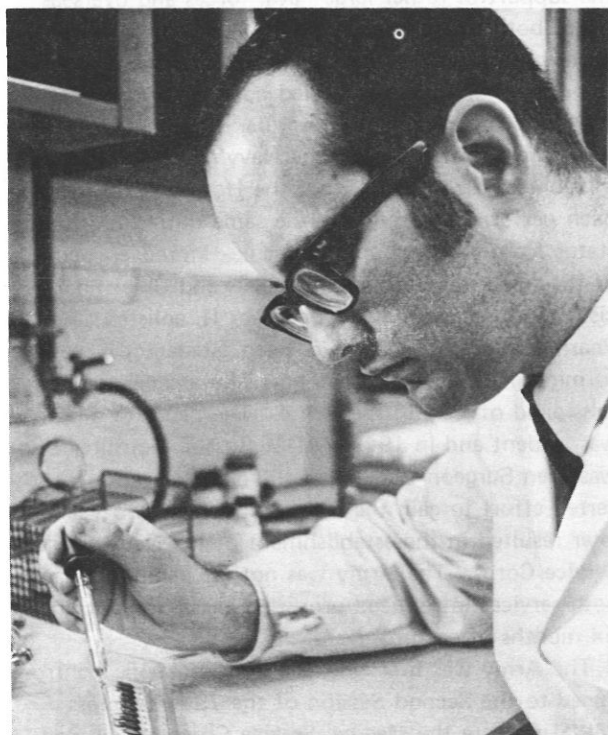
established the Hospital Corps. In addition to formalizing the enlisted structure of the Hospital Corps, this Act provided warrant officer rank for 25 of its members. Revisions of the Act in 1912 and 1916 redefined the enlisted rating structure and also established the rank of commissioned warrant officer for those warrant officers, called Pharmacists, who satisfactorily passed a prescribed examination. Those who did so were called Chief Pharmacists. For the first time medical personnel, who were not physicians, were granted commissioned status.

With the rapid buildup of naval forces during World War I, many senior enlisted personnel of the Hospital Corps were given temporary warrant officer rank and some civilians also received appointments as warrant officers in the Hospital Corps. In addition, a total of 81 Pharmacists and Chief Pharmacists received temporary appointments to the rank of lieutenant in the Medical Corps; all were specifically limited to performance of duties involving medical administration. After the war the majority of the almost 300 warrant and chief warrant officers, who had received temporary appointments, reverted to their permanent status. The officers who had received temporary commissions as lieutenants in the Medical Corps were given the opportunity to retain their rank by satisfactorily completing a professional examination; only three succeeded in doing so and all three held degrees in medicine. The authorized officer strength of the Hospital Corps, with slight variation, remained at 125 until the outbreak of World War II. From 1921 until 1941 some 138 warrant appointments were handed out to replace the losses that occurred by attrition.

At the height of World War II the enlisted strength of the Hospital Corps rose above 150,000 personnel,

and, in 1945 there were approximately 3,000 warrant and commissioned warrant officers. The World War I expediency of offering temporary commissions was once again utilized, but this time with one key difference. The need for commissioned officers who were skilled medical administrators had been well documented in the "war to end all wars," and the experience gained early in World War II demonstrated the same need for officers that were equally skilled in the practice of sciences allied to medicine. Consequently, and for the first time, some 900 reserve commissions in the Hospital Corps were granted to pharmacists, optometrists, and scientists. The scientists were identified with an H(S) specialty designator. They proved themselves equally as valuable in the field of research and preventive medicine as did their fellow pharmacists, optometrists, and administrators in their respective fields. However, the temporary legislation that authorized this expanded officer strength of the Hospital Corps was a stopgap measure due to expire six months after the cessation of hostilities, or as of 31 July 1948, whichever occurred first.

It was the performance of these highly skilled Hospital Corps officers during World War II that so dramatically demonstrated the absolute need for a permanent corps of commissioned and warrant officers, who were trained in medical administration and the sciences



LTJG Walter A. Girod, MSC, USN — a Microbiologist.



LTJG Mary A. Renfro, MSC, USNR — a Physical Therapist.

allied to the practice of medicine. Moreover, the post-war tensions and this Nation's foreign policy required the support of rather large naval forces and overseas bases; both added considerably to the professional responsibilities of the Navy Medical Department. While the Army had long maintained commissioned officers serving in the Pharmacy, Veterinary, Sanitary and Medical Administrative Corps, the Navy's warrant and commissioned warrant officers of the Hospital Corps had been performing essentially the same duties in a lower status from the standpoint of rank. Moreover, because of the small number of Pharmacists and Chief Pharmacists authorized prior to World War II, enlisted Chief Pharmacist Mates had in fact been satisfactorily performing many of the duties normally assigned to commissioned officers in the Army. The need for a change was evident and in 1945 VADM Ross T McIntire, who was then Surgeon General of the Navy, began a concerted effort to gain the legislation which two years later resulted in the establishment of the Navy Medical Service Corps. The Army was not far behind; in fact, both services introduced proposed legislation within six months of each other.

The Army was first when, in July of 1946, it introduced to the Second Session of the 79th Congress a bill "To create the Medical Service Corps in the Medical Department of the Army and for other purposes."

In the House the bill became H.R. 7167; in the Senate it was S. 274. Both bills were referred to committee.

The Navy introduced two bills to the First Session of the 80th Congress in January 1947. The first, numbered H.R. 1361 in the House and S. 238 in the Senate, was a bill "To establish the commissioned grade of Medical Administrator in the Hospital Corps of the Navy and for other purposes." The second bill, "To establish the Medical Associate Sciences Corps in the Medical Corps of the Navy," was introduced into the House as H.R. 1603 and in the Senate as S. 334. Both bills were referred to committee.

The House of Representatives considered all the bills at length and after extensive hearings, the Armed Services Committee decided to consolidate the bills introduced by the Army and the Navy into a single bill that would be applicable to both services; this House Bill, H.R. 3215, eventually became the Army - Navy Medical Service Corps Act of 1947. Among other things the bill:

(1) Established a Navy Medical Service Corps with an authorized strength of 20 percent of the regular Navy strength of the Medical Corps, and initially established three sections of the Corps — Pharmacy, Supply and Administration Section; Optometry Section, and; the Medical Allied Sciences Section. Pharmacy later became a separate section.

(2) Provided for a commissioned rank structure ranging from ensign to captain, with original appointments to be made in the grade of ensign, and with the proviso that applicants holding a doctorate degree could be appointed to the rank of lieutenant junior grade.



LCDR Thomas J. Delaney, MSC, USN, Health Care Administration Section (left) talks with LT Maurice T. Meaney, MSC, USN at the Naval School of Health Care Administration, National Naval Medical Center, Bethesda, Md.

(3) Authorized the Secretary of the Navy to establish other sections of the Corps as necessary and to prescribe the qualifications for the appointment of hospital corpsmen to commissioned rank.

(4) Established the procedures governing the administration of the Medical Service Corps.

Incidentally, this same Act established the Hospital Corps rating structure that still exists today and also gave the Secretary of the Navy the authority to appoint chief petty officers and petty officers first class of the Hospital Corps to the grade of warrant officer. This represented a significant change because previously all such appointments were made by the President from those serving in the regular Navy as Chief Pharmacist Mates. Later, of course, Hospital Corps warrant officers became members of the Medical Service Corps.

Although the 1947 Act provided for a Corps with grades up to and including Captain, no original appointments above the rank of lieutenant commander were made, despite the fact that many Hospital Corps officers who were appointed in the Medical Service Corps were, at the time of their appointment, serving in the temporary grade of commander. The October-November-December 1947 issue of the *Hospital Corps*

Quarterly, 20:4, published the names of the first 255 permanently commissioned officers in the Medical Service Corps. The rank of these "plank owners" was distributed as follows: 30 lieutenant commanders, 125 lieutenants, 50 lieutenant junior grades, and 50 ensigns.

The Act did not provide for a chief of the Medical Service Corps. This oversight was corrected in 1954 when the Congress gave the Secretary of the Navy the authority to appoint an officer of the Medical Service Corps, serving in the permanent rank of lieutenant commander or above, to serve in that position. While serving this officer would receive a temporary appointment to the rank of Captain, which he would hold during the four years of his appointed term. The first Chief of the Medical Service Corps was CAPT Willard C. Calkins, MSC, USN. He was succeeded by CAPT Leo J. Elsasser, MSC, USN in 1958; CAPT Elsasser was relieved by CAPT Robert S. Herrmann in 1962. In 1968 CAPT Emmett L. Van Landingham, Jr., MSC, USN, the current Chief of the Corps succeeded CAPT Herrmann.

Other significant changes to the original Act establishing the Medical Service Corps might be noted here.

The strength has been changed to 13/100 of one percent of the active duty strength of the Navy and



CAPT Emmett L. Van Landingham, Jr., MSC, USN, Chief of the Medical Service Corps, October 1968 to present.



CAPT Robert S. Herrmann, MSC, USN, (Ret.), Chief of the Medical Service Corps, October 1962 thru September 1968.



CAPT Leo J. Elsasser, MSC, USN, (Ret.), Chief of the Medical Service Corps, October 1958 thru September 1962.



CAPT Willard C. Calkins, MSC, USN, (Ret.), Chief of the Medical Service Corps, September 1954 thru September 1958.

Marine Corps, including the actual number of midshipmen at the Academy.

A Womens Specialist Section was established by the Secretary of the Navy in 1952; in 1965 the name of this section, which is composed of dietitians, occupational therapists, and physical therapists, was changed to "Medical Specialist Section." The first members of this section were Nurse Corps officers who transferred to the Medical Service Corps; since then qualified personnel from civilian sources have been commissioned in the grade of ensign. The 1965 alteration in the name allowed for qualified male applicants to be appointed to commissioned rank; the first man was given a commission during the same year that the name change was enacted.

A Podiatry Section was established in 1953.

In 1956 the original Act was further amended to allow Medical Service Corps officers to command appropriate facilities of the Medical Department. Currently the Corps has five commanding officers and six officers-in-charge; five of the eleven are health care administrators, five are allied scientists, and one is an optometrist.

The Supply and Administrative Section was redesignated the Health Care Administration Section in 1969.

The original 255 officers who received permanent

commissions in the newly established Medical Service Corps were assisted by several hundred more officers who held temporary commissions. From 1947 to 1950 the strength of the Corps grew and eventually leveled off at about 1000 officers. By the start of the Korean conflict this number had fallen to approximately 800, but slowly increased to some 991 officers in 1953. This increase continued and by 1965 there were approximately 1300 Medical Service Corps officers on active duty. In 1969 the active duty strength of the Corps had increased to about 1700 in number.

Today there are approximately 1668 officers on active duty in the Medical Service Corps, including 76 women. This constitutes a growth rate of over 700 percent since 1947. There are 934 officers in the Health Care Administration Section, including two women; 368 in the Medical Allied Sciences Section, including 16 women; 143 in the Optometry Section with one woman; 110 in the Medical Specialists Section, including 56 women; 102 in the Pharmacy Section with one woman; and 9 officers in the Podiatry Section.

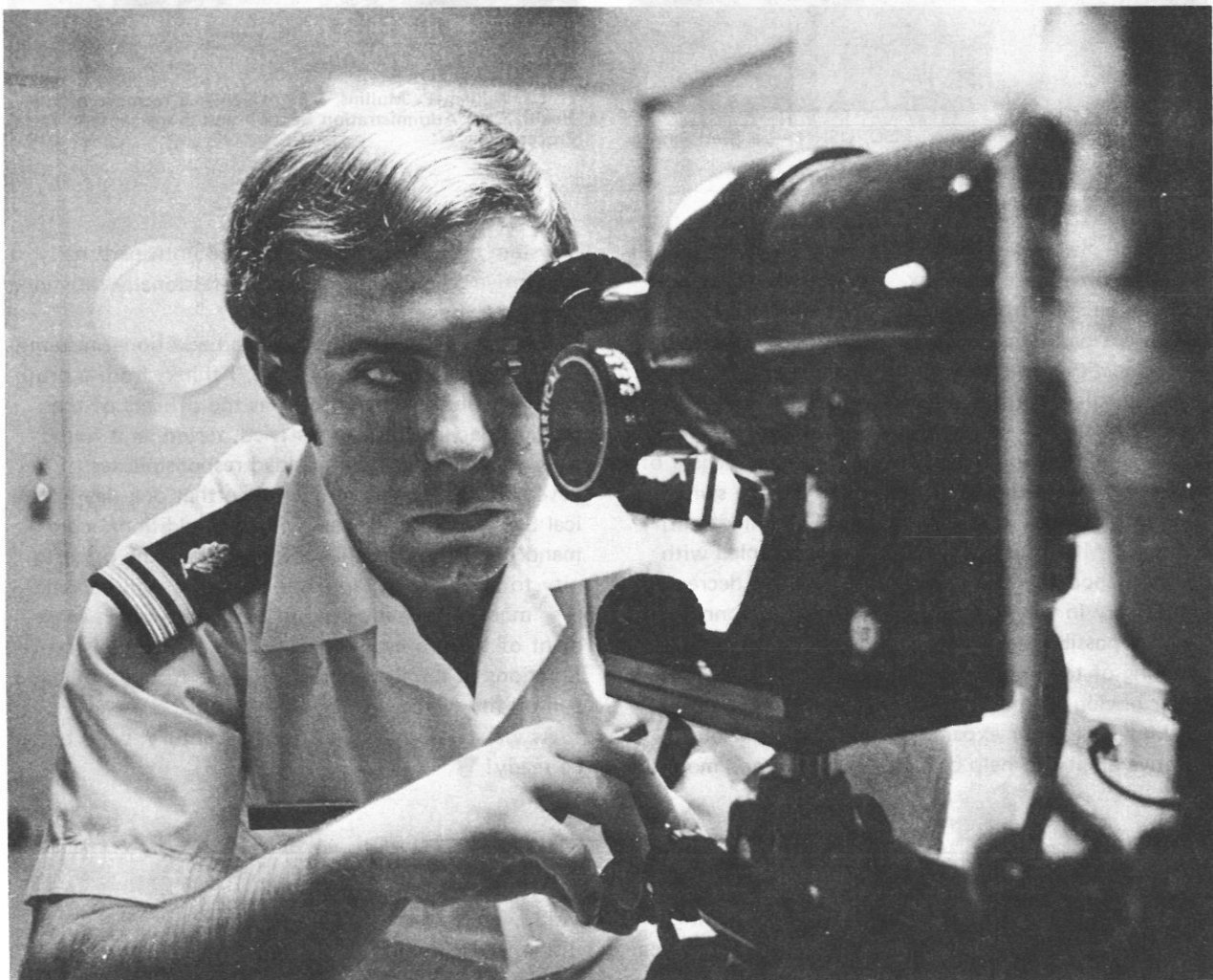
In the 25 years since the Medical Service Corps was founded, it has grown in stature as well as strength. In 1972 its members represent a wide variety of academic disciplines — ranging from research and the

allied sciences, to hospital administration and financial management — and they have become important members of the Navy's health care team. From the simple, albeit important, job of helping the ship's physician of the early 1900's to keep records and supervise his department, the Hospital Corps warrant officer has become a commander or captain who is now responsible for helping the doctor to provide the most sophisticated patient care, or for managing the complex operations of a naval hospital. Medical Service Corps officers today serve ashore and afloat, with the Marines and on the staffs of the major fleet commanders, and with the district commandants. Their knowledge and "can-do" spirit have earned for them the well-deserved reputation for getting things done, right, the first time.

We have, in short, "arrived," but that is not to say we can rest on our laurels. The future of the Medical Service Corps is one of increased challenge and

responsibility. The same forces that are affecting the health care delivery systems of the civilian medical community are also affecting those of the Armed Forces, including the Navy. Much has been spoken or written about what we should, or must, do to improve our system by practically everybody, from congressmen to concerned citizens. Despite what we too often hear, the Navy Medical Department, under the superb leadership of VADM George M. Davis, MC, USN, has earnestly and effectively pursued a number of programs designed to bring about needed improvements. Medical Service Corps officers have been extensively involved in the planning and execution of all these programs, as they will continue to be in those which emerge in later years.

However, our basic responsibility — to provide the officers of the Medical and Dental Corps with the best possible administrative, professional, and scientific



LTJG Edward J. Grout, Jr., MSC, USNR — an Optometrist.



LT Sandra L. Doppelheuer, MSC, USNR — a Dietician.

support — has not changed in the last 25 years, though it has become more complex. The impact of changes such as the shift to providing more patient care on an outpatient basis, the modulation and computerization of diagnostic procedures, and the increased utilization of paramedical personnel has not yet been fully evaluated. I personally believe that, from the standpoint of health care, they will exert at least the same degree of impact on the Medical Department as did the switch from sail to steam towards the end of the nineteenth century. When this probable impact is coupled with the likelihood that our patient load will not decrease appreciably in the near future — despite personnel cutbacks, a possible decrease of funds, and, hopefully, a lessening of tensions throughout the world — it seems rather obvious to me that we will be expected to use our knowledge, our experience, and above all, our innovative ability to help develop, maintain, and monitor



LT William F. Mullins, MSC, USN — a member of the Health Care Administration Section and a specialist in Data Processing.

a system of health care that will be both personally responsive to our patients and professionally satisfying to our personnel.

Over the years we have assumed additional responsibilities. This has resulted more, I think, from a process of evolution than design as the officers of the Medical Service Corps were tried, tested, and found fully capable of handling added responsibilities. I believe that this trend will continue; that one day Medical Service Corps officers will have additional command opportunities; that they will have the opportunity to achieve flag rank; and that they will become ever more closely involved in the day-to-day management of the professional, as well as the administrative functions of naval medical facilities. It may not happen on my watch, but it will happen.

As we start our second quarter century, we'd better be ready! ☸

CAPT Emmett L. Van Landingham, Jr., MSC, USN was recently appointed by the Secretary of the Navy to a one-year extension as Chief of the Medical Service Corps. CAPT Van Landingham has served as Chief of the Medical Service Corps since 1 October 1968 and his term of office will now expire on 1 October 1973. ☸



Naval School of Health Care Administration: Thirty Years of Medical Service Corps Education

**By CDR Wilham J. Auton, MSC, USN, Academic Director;*
and LCDR Robert B. Hinds, MSC, USN, Instructor*
(Photos by HM3 E. Larson, USN**)**

July 1972 marked the 30th anniversary of the Naval School of Health Care Administration whose training programs represent a significant portion of the inservice education of Medical Service Corps officers. The School, a component command of the National Naval Medical Center in Bethesda, Md., under RADM F.P. Ballenger, MC, USN, is commanded by CAPT William J. Green, MSC, USN.

HISTORY

The Naval School of Health Care Administration was born out of a World War II need to provide specialists in hospital and medical department administration. On 3 July 1942 RADM Ross T McIntire, MC, USN, Surgeon General of the Navy and Chief, Bureau of Medicine and Surgery, proposed to the Medical Officer in Command, National Naval Medical Center, Bethesda, Md., the establishment and maintenance of a class for thirty Pharmacists in general hospital management.

Emphasis was to be placed upon property and accounting, personnel, and commissary administration. The course was to be six months in length and centered around the provision of a technical capability that could be immediately employed in the field; primary efforts were directed to an on-the-job training approach. The first class convened on 3 August 1942 and was attended by 29 students. Initially the course was conducted within the training department of the Naval Hospital, Bethesda. On 29 June 1943 LT Glen F. Lyon, Hospital Corps, USN reported for duty as Officer-in-Charge, Hospital Corps Officers School and on 12 July 1943 the course was redesignated as the Hospital Corps Officers School. The School continued to utilize the personnel resources of the hospital's training department. It was not until 8 December 1943 that LT(jg) Bernard F. Duwel, Hospital Corps, USN reported as the first regularly assigned instructor. In January 1945 the length of the course was extended to eight months, and by this time five classes had graduated with 225 officer alumni.

The School was successful from the very beginning. Graduates were in great demand and quickly built a reputation for superior performance. In March 1945

*Naval School of Health Care Administration, National Naval Medical Center (NNMC), Bethesda, Md.

**Naval Medical Training Institute, NNMC, Bethesda, Md.



The President of the United States cited CAPT Robert M. Tennille, Jr., MSC, USN (left) for "exceptionally meritorious conduct in the performance of outstanding service as Commanding Officer, Naval School of Health Care Administration, NNMCMC, Bethesda, Md., from September 1968 to June 1972." The Deputy Surgeon General, RADMC John W. Albright, MC, USN (right), presented the Legion of Merit award for the President at a retirement ceremony held at NNMCMC, Bethesda, Md.

VADM McIntire, Surgeon General of the Navy, wrote to the Medical Officer in Command, National Naval Medical Center that: "Officers who have completed the course of instruction at the U.S. Naval Hospital Corps Officers School have demonstrated by the manner in which they have performed their duties that the School is a success." A subsequent recommendation was made that the School be commanded by an officer of the Hospital Corps. LCDR Glen F. Lyon reported on 2 August 1945 for duty as Officer-in-Charge, U.S. Naval School of Hospital Administration. The title of this position was later changed to "Commanding Officer." Many changes in the School's curriculum occurred in subsequent years and on 1 September 1960, through a cooperative program between The George Washington University and the School, an off-campus center of the College of General Studies was established under the direction of a University coordinator. All courses were accredited, with a maximum of 42 semester hours being granted to students who successfully completed the ten-month course in hospital administration.

In September 1959 an Orientation course, designed

for newly commissioned Medical Service Corps officers receiving commission directly from civilian life, was established at the School. And in October 1965 an Indoctrination program, for newly commissioned officers appointed to the Health Care Administration section of the Medical Service Corps under the inservice procurement program, was transferred from the Officer's Candidate School in Newport, R.I., to Bethesda.

A Research Division within the School was established in 1971 to study the organization and management of the Navy's health care delivery system.

The School now operates as the Naval School of Health Care Administration and provides instruction to Medical Service Corps officers in three major programs: a ten-month course in Health Care Administration, a five-week course in Indoctrination, and a four-week course in Orientation.

HEALTH CARE ADMINISTRATION PROGRAM

Annually, 40 officers are ordered to attend the ten-month course of full-time instruction in health care administration. To date a total of 1,330 students



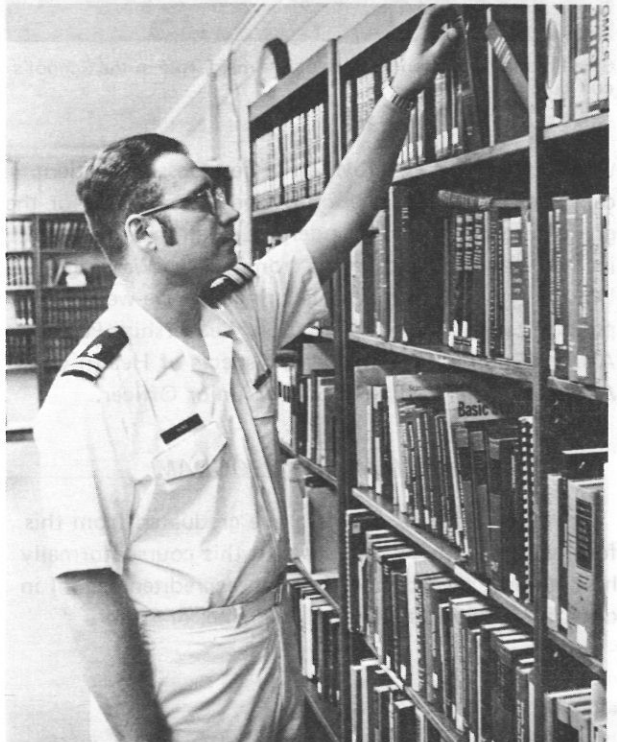
Discussion after class between Instructor and students provides an opportunity to clarify items brought out in lecture.

consisting of 1,242 U.S. Naval officers, nine U.S. Army officers, 60 U.S. Air Force officers, five U.S. Coast Guard officers and 14 foreign officers have graduated from the program. The program functions through a Navy/George Washington University agreement whereby students are granted as much as 51 hours of academic credits toward a Bachelor of Science in Health Care Administration degree at the University.

Spaced over three 15-week semesters, the curriculum is directed toward stimulating the student officer to think analytically and independently, to test his ideas, and to communicate effectively. The program includes courses in Health Economics, Financial and Material Management, Fundamentals of Management, Personnel Management, Medical Sociology, Public Speaking, Health Facility Planning, Health Care Organization and

Management, Accounting, Data Processing, Statistics, Expository Writing, Psychology, Labor Relations, Special Problems in Health Care Management, Information Systems and Research projects in Health Care Administration.

Regular presentations are supplemented by guest lecturers to broaden the students' understanding and knowledge. Seminars, panels, and research projects allow the students to correlate basic academic work with lecture material, to study and analyze the practical aspects of Medical Department administration and to join with their civilian colleagues in discussing and

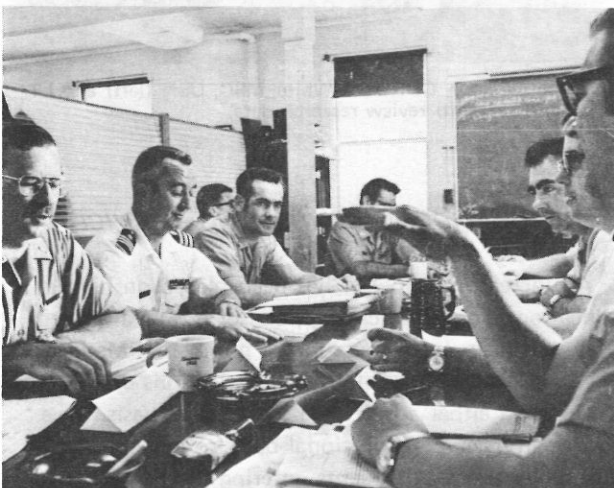


Ready access to the School's library enables students to collect data for term papers and research projects.

solving administrative problems. Field trips to various military and civilian facilities further allow the students to observe and evaluate, firsthand, the operations of a wide spectrum of medical activities.

INDOCTRINATION PROGRAM

This course, designed for MSC officers commissioned from enlisted status, has graduated 384 officers to date. It prepares the officer to assume his functional responsibilities at his first new duty station. It offers a conceptual framework of the interrelationships



Simulated labor negotiations are observed by CDR W.P. Davis, MSC, USN, the School's Executive Officer.

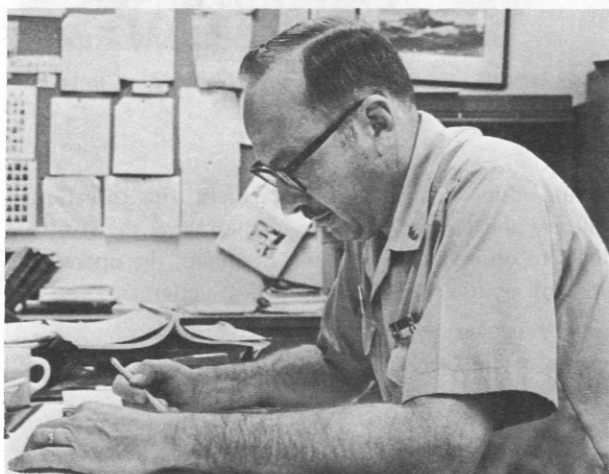


Small group discussion sessions play a major role in the School's curriculum.

which must exist to provide the best possible patient care. Successful completion of the course earns for the graduate three hours of undergraduate academic credit in Institutional Management from George Washington University. Course material during the five-week period covers: Naval Orientation, Leadership, Personal Affairs, Communication, Legal Aspects of Health Care Administration, and Role of the Junior Officer.

ORIENTATION PROGRAM

To date 860 MSC officers have graduated from this four-week course. Participants in this course normally hold an advanced degree, from an accredited school in one of the sciences allied to medicine, or from a



Instructors, like coauthor LCDR R.B. Hinds, MSC, USN, spend many hours gathering background material in preparation for lectures.

school with a graduate program in health care administration. The course is designed to acquaint the new officer with the organizational structures and administrative procedures of the Navy, military duties, customs and courtesies of the Navy, Military Justice and similar basic subjects. In addition to the classroom sessions, field trips are arranged to provide the officer an opportunity to observe his professional specialty and obtain firsthand information about his future role and responsibilities.



Research Director, CDR R.L. White, MSC, USN (left) and LT J.D. Bentley (right) review research data.

EDUCATIONAL COUNSELING SERVICE

An increasing emphasis has been placed on higher education in the Medical Service Corps. As a result there has been an increase in the number of Medical Service Corps officers attending institutions of higher learning on either a part-time or full-time basis. Due to the diversity of educational backgrounds and service experiences of students entering the School, and the curriculum requirements of the School and The George Washington University, a need for guidance in

planning individual academic programs was recognized. To meet this need, the Naval School of Health Care Administration formally established an educational counseling service in April of 1962. Now prospective students and personnel selected for appointment in the Medical Service Corps may obtain assistance from the School in planning their education programs. Since its inception the educational counseling service has provided more than 2,000 counseling services to Medical Department personnel.

EDUCATIONAL FACILITIES AND STAFF

The School has occupied the same building at the National Naval Medical Center since 1946. Contained within the one structure are the administrative offices, instructors' offices, classrooms, and the immediate support facilities. Additionally, a large and well-equipped auditorium serves as a classroom for most classes and is used for the Medical Service Corps Guest Lecture Series, Visiting Lecturer Series, Seminars, and other special meetings conducted for elements of the Medical Department in the greater Washington area.

The School Library, staffed by a full-time librarian, contains approximately 4,000 volumes and receives over 130 journals and periodicals. The collection includes books in social sciences and business administration, with emphasis on reference, teaching, and research publications in the fields of health care and public health administration. Supplementing the basic collection are: the Library of the National Institutes of Health, Library of Congress, National Library of Medicine, Edward Rhodes Stitt Library of the National Naval Medical Center, The George Washington University Library, and other special and technical libraries in the vicinity.

The research staff, in addition to conducting studies to improve the efficiency and effectiveness of the



LCDR T.J. Delaney, MSC, USN (left) assists student in planning further academic courses to fulfill degree requirements.

Navy's health care program, provides guidance to student officers in developing and preparing research projects in health care administration.

The staff of the School consists of eleven officers, seven enlisted and five civilian members. In addition to the staff officers, who hold full faculty appointments from The George Washington University, other faculty members of the University are utilized as necessary. The most viable part of the program is the teaching assistance contributed by many speakers from the component commands of the National Naval Medical Center, and the Bureau of Medicine and Surgery. These individuals, both military and civilian, generously donate their talents and expertise to provide the best possible educational process and demonstrate the cooperative effort required to place the Navy health care delivery system among the finest in the world.



Hospital Acquired Infections: Their Effect on Patients and Resources

By LT(jg) James H. Lewis, MSC, USNR, Assistant Chief,
Operating Services Division,* and; LCDR Gerald G. Comfort,
MSC, USN, Chief, Operating Services Division.*

INTRODUCTION

The Joint Commission on Accreditation of Hospitals recommends that every hospital have an infection committee charged with the responsibility of investigation, control, and prevention of infections within hospitals.¹ The Infection Committee of the Philadelphia Naval Hospital provides a program designed to meet the Commission's recommendation through four activities, namely: case finding, monitoring hospital practices, continuing education, and providing recommendations for action.

The Operating Services Division provides support to the Infection Committee by monitoring the level of sanitation within the hospital environment. Currently, the Division is exploring alternatives for improving the sanitation function which suffers from insufficient personnel. In planning for change, it is felt that an evaluation of the sanitation activity is necessary. However, new direction based on an evaluation of this program element only may provide suboptimal choices, since there are several other important activities that complete the program structure and they should be con-

sidered in planning. Consequently, a comprehensive evaluation has been undertaken to further specify the problem of hospital-acquired infection, and delineate the relationship of program activities to each other and to the program objective.

The conceptual framework for the evaluation was developed by Deniston, et al.^{2,3} In general, the model consists of viewing a program as a combination of resources, activities, and several kinds of objectives. The activities are seen as having sub-objectives whose attainment is necessary in order to accomplish the ultimate program objective — in this case, the minimization of hospital-acquired infection. This logic and other techniques are applied to answer the four evaluative questions presented below:

- a) *Appropriateness*: How important is the hospital-acquired infection problem relative to other problems?
- b) *Adequacy*: What portion of the entire problem is the program directed toward overcoming?
- c) *Effectiveness*: To what extent are preestablished objectives attained as a result of activity?
- d) *Efficiency*: What is the cost in resources of attaining the program objective?

A discussion of program appropriateness is presented here. Assessments of program adequacy, effectiveness, and efficiency are in preparation.

*Naval Hospital, Philadelphia, Pa., 19145.

The opinions expressed herein are those of the authors and cannot be construed as reflecting views of the Navy Department or of the naval service at large.

APPROPRIATENESS

An evaluation of appropriateness serves to answer the following questions:

a) What is the magnitude of the hospital-acquired infection problem at this activity?

b) What is the priority of the problem relative to other problems?

The aim of this portion of the evaluation is to provide an answer to question (a) through a statement of the problem. It is hoped that this will be useful to decision-makers in answering question (b). The following discussion addresses the problem as it effects the components of the hospital complex, namely, the patient population and the organization's resources.

1. *Patient Population.* Hospital-acquired infections represent an additional attack on the patient's health superimposed upon the factors that necessitated hospitalization. To the extent that infections are avoidable, they present a unique problem since patients do not expect the medical care process to include additional morbidity or mortality. Infection experience generated by hospital sources constitutes a partial barrier to the basic goal of the organization, the swiftest possible return of the patient to a positive state of health. Some of the possible specific effects of hospital-acquired infections are listed below:

a) delay in return of active members of the armed services to their normal environment

b) delay in return of dependent and retired members to their normal environment

c) productivity loss to the government, the patient, etc.

d) patient dissatisfaction.

Gathering data to measure these specific effects would be a formidable task which has not been attempted here. However, data concerning the number of hospital-acquired infections, delay effect, and attack rate were readily compiled, providing gross indicators as a basis for forming judgments about the effects of hospital-acquired infections.

The first six months of Fiscal Year 1972 were chosen as the period for study since the interval reflects recent experience. Infection Committee minutes were used to provide a base indicator of the number of hospital-acquired infections. These documents indicate that there were 97 reported cases during the relevant period.

A measure of the delay effect was provided by five chiefs of service from areas where the Committee minutes revealed experience with hospital-acquired infection. These physicians were asked to estimate the excess days of inpatient care for 51 infections

based on the following case factors: primary diagnosis, infection site, organism, and severity of illness. Responses were obtained for 51 of the 97 cases since all four factors were not available for all cases. The estimates were then tabulated to provide a mean number of excess days. The average excess per patient was 10.9 days.

In order to develop an indicator of the validity of the average, the actual length of stay for each of the 51 cases was researched. The length of stay for 32 of the 51 cases was available and indicated that the average length of stay was 44 days.* Within the services where these patients were treated, the average length of stay was 20 days.† The difference between the service and infected patient average length of stay was 24 days. Estimations by the chiefs of service were also compared to the findings presented in the literature. In one study, age, sex, diagnosis, and operative procedure variables were matched to determine the mean excess stay for surgical patients with hospital-acquired infection. These patients experienced an average of 15.2 days of discharge delay.⁴ In a less sophisticated study, patients acquiring staphylococcal infections at the Hospital of the University of Pennsylvania remained 24.7 days beyond the average stay.⁵

A calculation of the attack rate during the six-month period indicates a ratio of one hospital-acquired infection to 62 discharges, or 1.6% of all discharges.† This computation included psychiatric discharges which may provide a fallacious indicator of experience, since the factors influencing infection are not as likely to be present in this patient category.⁶ (pp6-7) Furthermore, there were no reported infections in these patients during the study period.

Validity. The validity of the data presented above is based on a reporting process provided through the Infection Surveillance Nurse activity. The following elements have been suggested as determinants of the completeness of reporting systems:⁶(pp22-23),⁷

a) Availability of time to pursue the collection of data,

b) The backing of the Infection Committee,

c) The number and type of organized reporting procedures,

d) Interest and knowledge of surveillance personnel, and

e) The degree to which the purpose of the reporting process is explained and clarified for the staff.

There are several indications that reporting during

*Data obtained from Admission Form: Patient Affairs Division.

†Data obtained from Recaps All Categories, July-December 1971: Patient Affairs Division.

the study period may have been incomplete. First, the surveillance activity personnel consisted of two nurses who had full-time commitments to other specialized tasks. According to the manpower requirements suggested by the American Hospital Association, the reporting function alone, for a 1,000 bed hospital, requires 50 man-hours per week.^{6(p23)} Considering their commitment to other tasks, the requirements of the reporting procedure, and other surveillance duties, it is likely that the reporting procedure was limited by the availability of time to pursue the collection of data. In addition, the bacteriology record represented the only organized method for collecting data. According to Brachman,^{7(pp331-335)} results developed from the surveillance activity at five university-associated teaching hospitals suggest that the percentage validity of reporting is a function of the number of organized reporting sources. This study

indicates that the bacteriology record has a reliability of 63%. Data from several other surveillance activities suggest that use of this source of reporting alone provides 60% validity. Finally, we suspect that if the surveillance activity had been "intense" the documentary evidence of attack rate would have been significantly greater than the 1.6% reported for the study period. For example, at Johns Hopkins Hospital and the University of Kentucky Medical Center, the hospital-acquired infection rates were reported at 4% and 6% respectively, following intensive case finding procedures.^{8,9}

Table 1 provides a summary of the number of infections, delay effect, and attack rate as presented above. The data is also displayed with psychiatric discharges deleted and with the reported experience doubled in order to indicate more realistic effects if significant under-reporting did occur.

Table 1.

INDICATORS OF THE EFFECT OF HOSPITAL-ACQUIRED INFECTION ON THE PATIENT POPULATION

JULY-DECEMBER, 1971

NAVAL HOSPITAL, PHILADELPHIA, PA.

	NUMBER PATIENTS	ESTIMATED EXCESS DAYS	ATTACK RATE: ALL DISCHARGES†		ATTACK RATE: MINUS PSYCHIATRIC DISCHARGES*	
			RATIO	%	RATIO	%
REPORTED EXPERIENCE	97	10.9	1:62	1.6	1:55	1.8
DOUBLE REPORTED EXPERIENCE	194	10.9	1:31	3.2	1:27	3.6

†Total discharges, July-December, 1971: 6,064

*Psychiatric discharges, July-December, 1971: 664

2. Hospital Resources. When discharge is delayed by the presence of hospital-acquired infection, the hospital expends resources above that which would have been required for treatment of illness without infection. Assuming the usual constraint of limited resources, assets expended in the treatment of hospital-acquired infections represent the loss of opportunity to use the same resources in alternate ways. This "opportunity cost" provides a source of further resource constraint and may effect the attainment of important goals. Consequently, the incidence of hospital-acquired infection above an acceptable level represents an excess burden on the organization's resources.

Measures of the excess burden are difficult to devise. An effort to represent them by the cross-hatched area of the resource expenditure curve is presented in Figure 1.

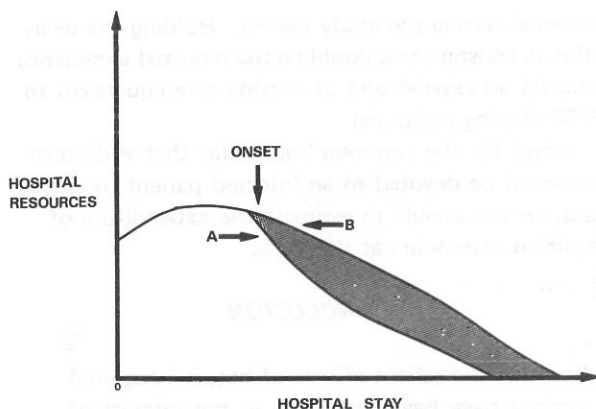


Figure 1: Resource expenditures for non-infected and infected hospital stay. Line A represents average expenditure in resources during the average hospital stay. Line B represents expenditures for an average stay when hospital-acquired infection occurs.

Line A suggests the average expenditure in resources (labor, equipment, and supplies) during the average hospital stay. Expenditures are relatively large during the first few days of care and taper off gradually. Line B represents expenditures for an average stay when hospital-acquired infection is present. The expenditures are the same until the onset of infection. After onset of infection, resources are expended in larger quantities and for a longer period of time, reflecting the increased demand on hospital personnel, supplies, and equipment. Currently, we are unable to cost-out the two curves; however, occupied bed days, dollar cost of a patient day, and provider man-hours would indicate the quantitative difference.

Occupied Bed Days. During the study period there were 131,829 occupied bed days.[†] Using the estimates provided by the chiefs of service (10.9 days), and the number of reported infections (97), there were 1,057.3 excess occupied-bed days attributable to patients with hospital-acquired infection, or .8% of all occupied-bed days. Holding the delay factor constant and doubling the reported infections serves to indicate that 1.6% of all occupied-bed days would be attributed to hospital-acquired infections. Deletion of the psychiatric discharges indicates that 1.1% of bed days were attributed to delay. Holding the delay factor constant and doubling the number of infections indicate that 2.2% of these bed days would be associated with acquired infections. This data is summarized in Table 2.

Table 2.

**INDICATORS OF THE EFFECT OF
HOSPITAL-ACQUIRED INFECTION ON THE
ORGANIZATION'S RESOURCES:
OCCUPIED-BED DAYS**

JULY-DECEMBER, 1971

NAVAL HOSPITAL, PHILADELPHIA, PA.

Total Occ. Bed Days	131,829
Estimated Excess Occ. Bed Days ^a	1057.3
Excess as % of Total ^b	8%
Double Excess as % of Total ^c	1.6%
Total Occ. Bed Days Psych Deleted ^d	100,273
Excess as % of Total Psych Deleted ^e	1.1%
Double Excess as % of Total Psych Deleted ^f	2.2%

a. 97 Patient X 10.9 excess days

b. 1057.3 excess days divided by 131,829 occ. bed days

c. 2 X .8%

d. 131,829 total occ. bed days - 31,556 Psych occ. bed days

e. 1,057.3 excess days divided by 100,273 occ. bed days:

Psych deleted

f. 2 X 1.1%

[†]Data obtained from Recaps All Categories, July-December 1971: Patient Affairs Division.

Table 3.

INDICATORS OF THE EFFECT OF HOSPITAL-ACQUIRED INFECTION ON THE ORGANIZATION'S RESOURCES: DOLLAR COST

JULY-DECEMBER, 1971

NAVAL HOSPITAL, PHILADELPHIA, PA.

Average Cost/ Patient Day	Estimated Excess Days	Cost/ Excess Stay ^a	Total Excess Cost Reported Infections ^b	Total Excess Cost: Double Reported Infections ^c
\$64.55	10.9	\$703.59	\$68,248.23	\$136,496.46

a) \$64.55/patient day X 10.9 excess days

b) 97 reported infections X \$64.55/patient day X 10.9 excess days

c) 194 X 64.55/patient day X 10.9 excess days

Dollar Cost. According to Hicks,¹⁰ the cost of each hospital-acquired infection is about \$4,000. The input factors which contributed to this estimate of cost in the civilian medical care complex included: out-of-pocket cost to the patient, hospital per diem rates, provider fees, litigation costs, economic loss to employers and employees, and other costs.

Our cost analysis is based only on the cost of a patient day. Using the estimated 10.9 days provided by the chiefs of service and the average cost of a patient day during the study period (\$64.55/patient day),* the additional cost of a patient stay complicated by a hospital-acquired infection was \$703.59. The total excess cost of treatment during the study period was \$68,248.23. Holding the delay factor constant and doubling the number of reported infections provides a total six-month cost of \$136,496.46. This data is summarized in Table 3.

Personnel. It is related by the Chief, Nursing Service that nursing personnel expend 4.5 hours of nursing care per patient day. On the basis of this and the chiefs of service estimate of 10.9 days of excess care, patients with hospital-acquired infections required 4,753.85 hours of nursing care beyond that which would normally be required for non-infected patients. Assuming a 40-hour work week and discounting for holidays and leave time, there were about 904 man-hours available from each staff member.† This data indicates that patients with hospital-acquired infections required the full-time efforts of 5.26 Nursing Service

personnel during the study period. Holding the delay estimate constant and doubling the reported experience indicates an expenditure of nursing care equivalent to 10.52 nursing personnel.

Except for the common knowledge that additional time must be devoted to an infected patient by physicians, we are unable to estimate the expenditure of physician man-hours at this time.

CONCLUSION

Some of the salient effects of hospital-acquired infections have been presented in the interest of further specification of the problem. As an indicator of program success or failure, the data is not specific enough to indicate areas of weakness. Currently, we are in the process of gathering data to measure the adequacy, effectiveness, and efficiency of program activities. Hopefully, this will identify the areas that require improvement and appropriate action may then be taken.

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*Cost per patient day data provided by the Chief, Fiscal and Supply Division.

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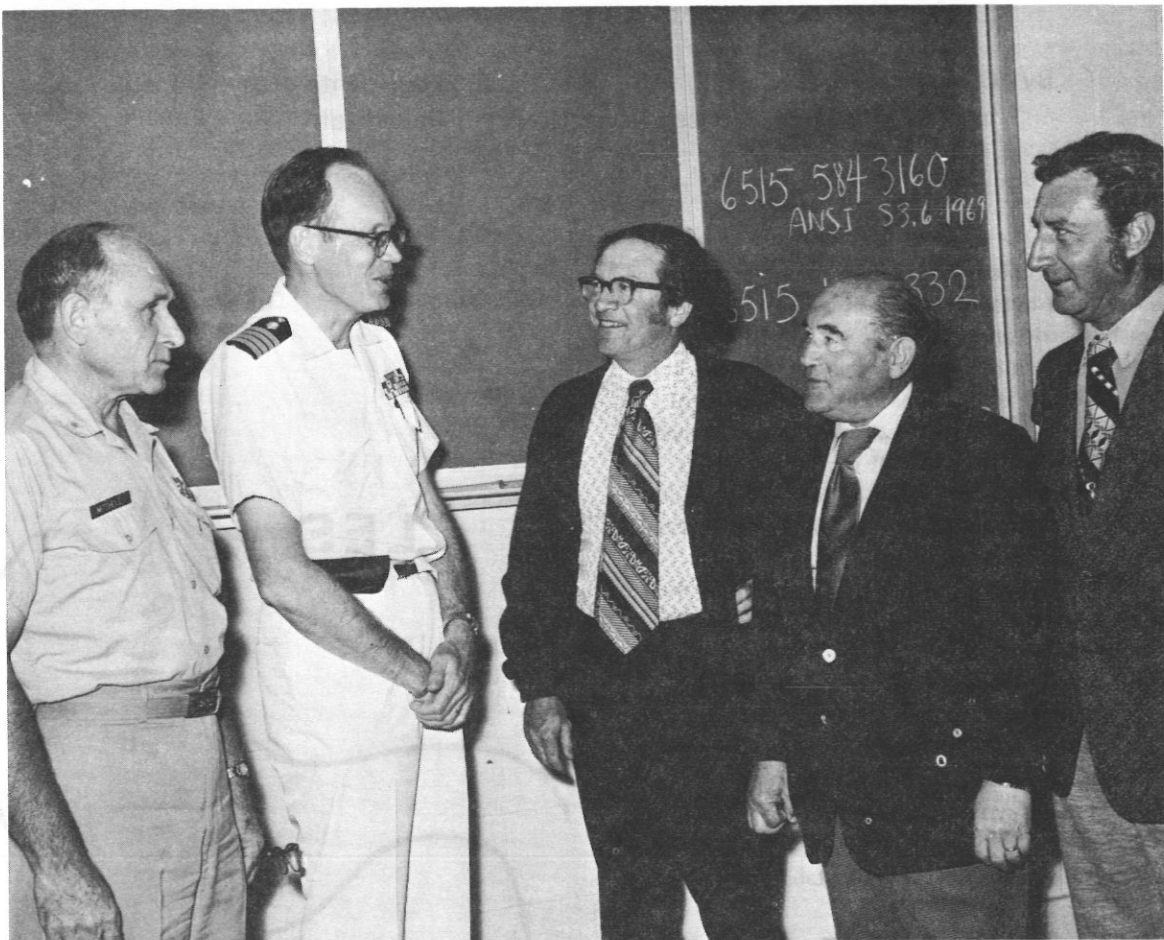
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CHABA MEETING

The Naval Aerospace Medical Institute (NAMI) and Research Laboratory (NAMRL) served as the site of the Ninth Meeting of CHABA (Committee on Hearing and Bioacoustics) Subcommittee Six "Problems in Military Otology and Audiology." Hosting the meeting was the Acoustical Sciences Laboratory whose Head, Dr. Carl E. Williams, is a member of the Subcommittee.

Among some 22 Army, Navy, Air Force and civilian attendees were: Dr. Dixon Ward of the University of Minnesota and currently President of CHABA; Dr. Aram Glorig, Director of the Callier Hearing and Speech Center, Dallas; and COL Harry McCurdy, Chief of Otolaryngology, Walter Reed Army Hospital.

The major topics discussed at the meeting were related to hearing conservation in the three services.



Photographed in attendance, from left to right, are: CAPT Robert Mitchell, Head, Medical Sciences Department, NAMRL; CAPT George Hart, Chief, ENT, Naval Hospital, Annapolis, and currently Chairman of CHABA Subcommittee Six; Dr. Dixon Ward; Dr. Aram Glorig; and Milton Whitcomb, Executive Secretary of CHABA. (PAO, Naval Aerospace Medical Center, Pensacola, Fla.) ☘

THE GASTROENTEROLOGISTS' CORNER

THE SENSUOUS SPHINCTER

By CDR Donald O. Castell, MC, USN, Head, Gastroenterology Branch,
Internal Medicine Service, Naval Hospital, Philadelphia, Pa.

Although anatomically a specific sphincter at the gastroesophageal junction has been difficult to demonstrate, manometric and radiologic studies have confirmed the presence of a physiologic sphincter in this location. Figure 1 is a schematic representation of this lower esophageal sphincter illustrating the physiologic importance of this segment of the esophagus. The primary function of this sphincter is to provide a barrier to prevent the reflux of the highly acid gastric contents into the lower esophagus.

In 1970 the effect of the hormone gastrin on this sphincteric mechanism was first shown.¹ Following the injection of pentagastrin, marked increases in lower esophageal sphincter pressure occurred in normal subjects. Subsequent studies indicated that not only did exogenous pentagastrin effect this sphincter, but the stimulation of the release of endogenous gastrin, from the gastric antrum, would also increase pressure in this area.² These initial observations opened the door to a great variety of studies on the importance of gastrin

The opinions expressed herein are those of the author and cannot be construed as reflecting the views of the Navy Department or of the naval service at large.

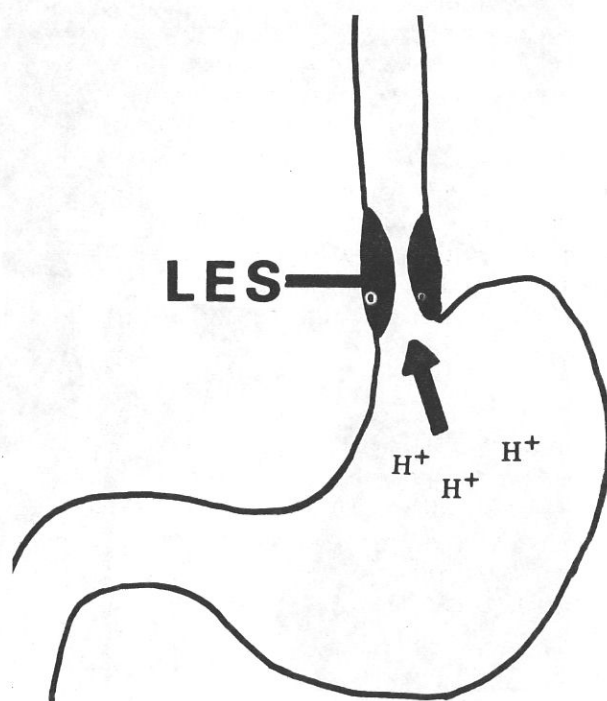


Figure 1.—Schematic representation of the action of the lower esophageal sphincter (LES) in preventing acid reflux.

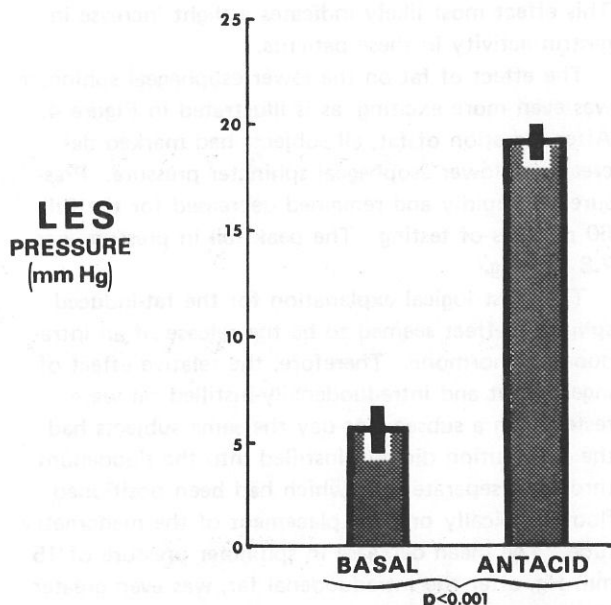


Figure 2.—Lower esophageal sphincter (LES) pressure in heartburn patients during basal conditions and after antacid ingestion. Bars indicate mean and ± 1 SE.

and other gastrointestinal hormones for control of the anti-reflux mechanism at the lower end of the esophagus. During the past three years, a variety of studies in the Gastroenterology Unit at the Naval Hospital in Philadelphia have resulted from follow-up observations of this mechanism.

Since alkalinization of the antrum is one of the known mechanisms for stimulating endogenous gastrin release, it seemed reasonable to expect that ingestion of alkali would raise the pressure in the lower esophageal sphincter. In a group of normal volunteers, mean resting pressure of 17 mm Hg increased to a peak pressure of 30.5 mm Hg within 20 minutes after ingestion of a commercial antacid. Of even greater interest was the effect of antacid on patients having an incompetent lower esophageal sphincter and symptomatic reflux (Figure 2). These patients had a basal pressure mean of 5.6 mm Hg, which is consistent with the observations of Winans and Harris,³ and others, that a sphincter pressure less than 10-11 mm Hg is usually found in patients with symptomatic heartburn. After ingestion of antacids by these patients, the mean sphincter pressure rose to 19.6 mm Hg within 20 minutes. The extension of the initial study on gastrin and the lower esophageal sphincter into the use of antacid preparation led to the conclusion that the treatment of heartburn by antacids is probably even more rational than initially thought; that is, antacids not only neutralize gastric acid but possibly also help prevent the reflux by increasing the pressure barrier at the distal esophagus.

It has subsequently been shown that besides gastrin other gastrointestinal hormones, particularly secretin, may effect this sphincter.⁴ These interrelationships are shown in Figure 3. The effect of secretin in blocking the gastrin stimulatory effect on the sphincter is illustrated. This is not surprising, since secretin is a known inhibitor of gastric acid stimulation by gastrin.

Patients with symptomatic gastroesophageal reflux commonly complain of their heartburn after ingestion of foods of many kinds. Since gastrointestinal hormones are known to be released in response to the ingestion of foods, it seemed reasonable to look into the relative effects of food on lower esophageal sphincter pressure. Gastrin stimulates this sphincter, and, therefore, we had postulated that a protein meal would most likely increase sphincter pressure, since protein has been known for years to be a stimulator of endogenous gastrin release. But what about the effects of other common foods? This question has been attacked vigorously by LCDR Otto Nebel during his Gastroenterology Fellowship. Dr. Nebel has studied the effects of relatively pure foods on lower esophageal sphincter pressure.⁵ These studies were performed on a group of normal volunteers after an overnight fast. Pressures were recorded continuously from the lower esophageal

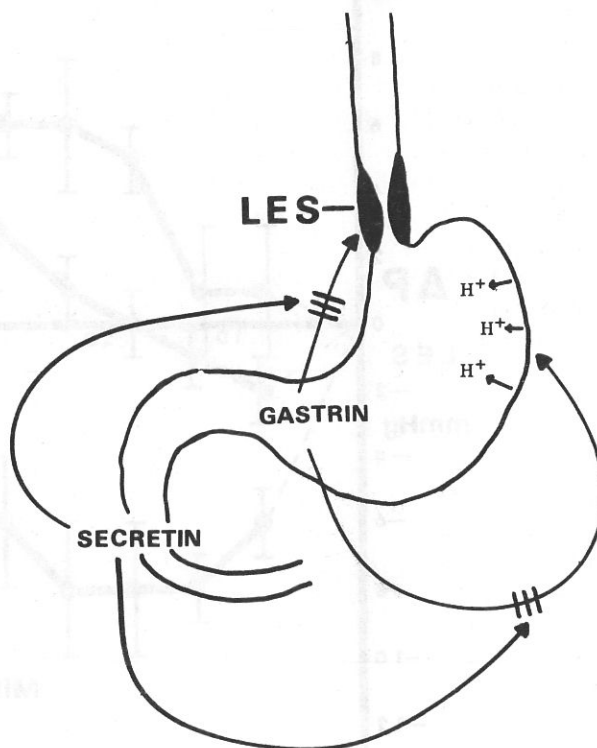


Figure 3.—Schematic representation of the action of gastrin and secretin on control of the lower esophageal sphincter (LES) and acid-producing parietal cells.

sphincter for a basal period of at least 20 minutes. Each subject then ingested on subsequent days each of three test meals. The protein, carbohydrate, and fat meals each consisted of 150 calories in a total volume of 150 ml of water. The ground-beef meal consisted of one cooked hamburger diluted to 150 ml by distilled water. The carbohydrate meal consisted of 37.5 gm of glucose in 150 ml of water, and 25 ml of corn oil solution suspended in 125 ml of water served as the fat meal. Following the ingestion of each meal, these subjects were studied for an additional 60-minute period. Figure 4 shows the results of these studies. After ingestion of the protein meal, significant increases in sphincter pressure occurred in all subjects studied. The pressure began to rise within the first 10-15 minutes, and reached a peak pressure change of 7.8 mm Hg at 45 minutes. This response was certainly predictable from our previous observations of gastrin and its effect on sphincter pressure. After ingestion of the glucose solution, slight increases in sphincter pressure were noted. Significant increases in pressure occurred only at 30 and 45 minutes and were but 2.9 mm Hg.

This effect most likely indicates a slight increase in gastrin activity in these patients.

The effect of fat on the lower esophageal sphincter was even more exciting, as is illustrated in Figure 4. After ingestion of fat, all subjects had marked decreases in lower esophageal sphincter pressure. Pressure fell rapidly and remained decreased for the full 60 minutes of testing. The peak fall in pressure was 7.8 mm Hg.

The most logical explanation for the fat-induced sphincter effect seemed to be the release of an intraduodenal hormone. Therefore, the relative effect of ingested fat and intraduodenally-instilled fat were tested. On a subsequent day the same subjects had the fat solution directly instilled into the duodenum through a separate tube which had been positioned fluoroscopically prior to placement of the manometry tube. The mean decrease in sphincter pressure of 15 mm Hg, after the intraduodenal fat, was even greater than that noted after oral fat. These results seem consistent with the effect of fat in promoting the release of a duodenal hormone, having a resulting inhibitory

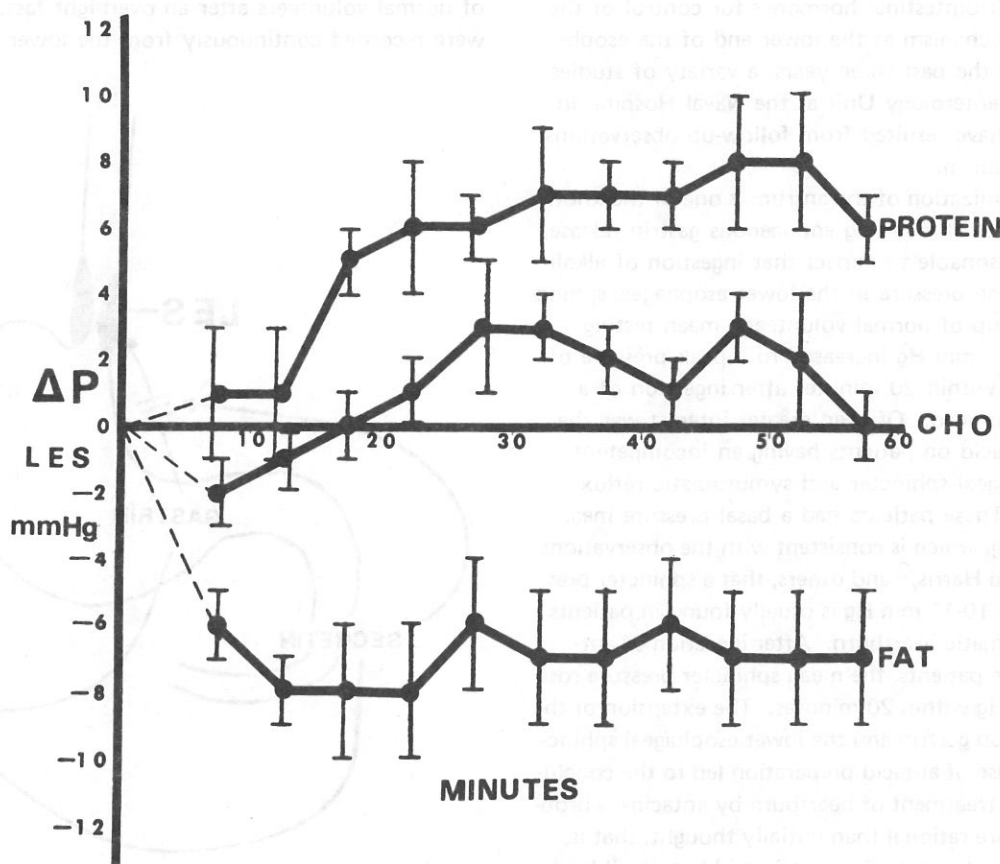


Figure 4.—Change in lower esophageal sphincter pressure (ΔP LES) from basal levels after ingestion of protein, carbohydrate (CHO), or fat. Vertical brackets indicate \pm SE of the mean.



CDR Castell makes ward rounds with the Gastroenterology staff, standing (from left to right): Drs. Chappelka, Macionus, Castell, Nebel, Farrell, and Kirchner.

effect on lower esophageal sphincter pressure. Although secretin has been shown to adversely affect the sphincter by blocking gastrin stimulation, it is unlikely that fat produces significant secretin release. In fact, further studies in our laboratory by Dr. Nebel have supplied evidence against secretin as the promoter of this effect, and suggest rather that another enterogastrotrone is the agent involved. It has recently been shown that cholecystikinin does have an inhibitory effect on lower esophageal sphincter pressure,⁶ and it seems reasonable to postulate that this may well be the hormone exerting the fat-induced inhibition of sphincter pressure.

The striking inhibitory effect of fat on the lower esophageal sphincter offers an attractive explanation for some forms of fatty food intolerance. That is, the patient with the incompetent or borderline-competent sphincter pressure might note ready reflux of acid gastric contents into the esophagus following the ingestion of a fatty meal.

We next turned our attention to the relative effects of a combined protein and fat meal on the sphincter, since this mixed meal should more closely resemble usual food intake. In these normal subjects the protein meal, as described above, was given on the initial day of testing. On a subsequent day, the patients ingested the combined protein and fat meal. The positive sphincter pressure response to the protein meal was again observed. With the ingestion of the combined protein/fat meal, there was an inhibition of the protein stimulation and, in fact, significant decreases in sphincter pressures were demonstrated. These

results would seem to indicate that fat has the ability to abolish the protein effect on sphincter pressure.

The relative effect of fat and antacid also seemed to be of clinical importance. Again, following a 15-minute basal period, the 150-calorie corn oil meal was ingested. After 15 minutes the pressure had fallen from 15 mm Hg to a low point of 9 mm Hg. With the ingestion of commercial antacids at that point, a pressure rise occurred to a level of 13.6 mm Hg within the subsequent 20 minutes. It is of interest that in these normal subjects, with the ingestion of fat, mean pressure fell from a normal value (15 mm Hg) to a level below that usually found in patients with an incompetent lower esophageal sphincter, that is, less than 10 to 11 mm Hg. However, with the subsequent ingestion of commercial antacid, pressure again rose to a value almost identical with basal levels. These observations indicate that although fat does have an adverse effect on the lower esophageal sphincter, this effect can be overcome by alkalization of the stomach in the form of antacid therapy. Thus our data suggest that the treatment of postprandial heartburn with antacids is physiologically sound, as well as clinically useful.

Our studies on the effects of hormones and foodstuffs on the lower esophageal sphincter have provided many interesting insights into the mechanism by which this muscle is controlled, and also the physiologic explanation for heartburn. More recently LCDR John Babka, working in our laboratory, has been studying the effect of other specific foods on sphincter pressure. Rapid and sustained decreases in sphincter

pressure occur in normal subjects after ingestion of chocolate syrup. These results were not surprising and were initially thought to be due to the fat content of the chocolate. However, it is of interest that in the preparation of chocolate syrup, most of the fat of chocolate is removed, resulting in fat content of only 1.2%. These marked decreases in sphincter pressure after chocolate syrup ingestion would therefore seem to require a different explanation. Further study revealed that chocolate has a fairly high content of methylxanthine preparations, namely theobromine and caffeine. Although the effect of these agents on lower esophageal sphincter pressure has never been studied, there is evidence that methylxanthines will cause relaxation of gastrointestinal smooth muscle. This action is believed to be due to an increase in cyclic AMP.⁷ These preliminary observations suggest that chocolate has an adverse effect on the lower esophageal sphincter through an entirely new mechanism, the increased content of cyclic AMP in the sphincteric muscle area. We hope to be able to provide further insight into the mechanisms of action of the methylxanthines on sphincteric pressure in the near future.

Our studies of the physiology and pathophysiology of the lower esophageal sphincter have broadened our horizons concerning the action of this antireflux

mechanism. Experimental support for many of our clinical "truths" has been obtained and studies now in progress offer promise of new therapeutic vistas for the heartburn sufferer.

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A FATHER'S PROUD MOMENT



With obvious pride, LCDR Glenn M. Ellis, MSC, USN commissions his daughter, Jo Carol, as an ensign in the Navy Nurse Corps. Following indoctrination at Newport, R.I., the new ensign will report to the Naval Hospital, Charleston, S.C. Ms. Ellis, who enlisted in the Navy last year under the Officer Candidate Hospitalman Program, received her commission following graduation from the DePaul Hospital School of Nursing, Norfolk, Va. Her father is Chief of the Patient Affairs Division at the Naval Hospital, Portsmouth, Va.—PAO, Naval Regional Medical Center, Portsmouth, Va. 🍀

Exercise Stress Testing in Patients with Arteriographically Demonstrated Coronary Artery Disease

By LCDR W.V.R. Vieweg, MC, USN, and CAPT Dixon A. Lee, MC, USN;
Cardiology Department, Naval Hospital, National Naval Medical Center,
Bethesda, Md.

Standard clinical tools, including the resting electrocardiogram (EKG), frequently are not adequate for proving or disproving the presence of Coronary Artery Disease (CAD). Hence, Exercise Stress Testing (EST) was developed in an effort to improve the sensitivity of the EKG in detecting the presence of CAD. More recently EST has been utilized in patients with proven CAD to assess the degree of functional impairment. A number of investigators^{1,2,3,4} have utilized EST but neither the sensitivity nor the specificity of this clinical tool have been clearly defined. Selective coronary arteriography (SCA) is the most precise technique available for detection and quantification of the coronary

atherosclerotic process in living patients. Thus, comparison of EST and SCA in a group of patients is probably the most efficacious means of investigating the clinical usefulness of EST.

It is the purpose of this report to define the sensitivity of EST by analyzing its results in a group of patients, all of whom have significant coronary atherosclerosis, as determined by SCA. In so doing, the authors hope to provide the reader with greater insight into the usefulness and limitations of Exercise Stress Testing.

Materials and Methods

One hundred and seventy-two patients underwent SCA at the Naval Hospital, National Naval Medical Center, Bethesda, Maryland between July 1970 and December 1971. One hundred and eight patients were

The above paper was presented in part before the Washington Heart Association on 7 Dec 1971 in Washington, D.C.

The opinions or assertions contained herein are those of the authors and cannot be construed as reflecting the views of the Navy Department or the naval service at large.

considered to have significant CAD (63%). Of these 108 patients, 25 underwent EST administered by us according to the method of Bruce¹ within a several day period prior to SCA. Many others of the 108 patients underwent EST by different methods but they are not included in this report.

Twenty-four of the 25 patients who underwent EST by the Bruce technique were men whose ages ranged between 28 and 57 years. The 25th patient was a 49-year-old woman. Twenty-two of the 25 patients had classical angina pectoris, on admission, of three weeks to eight years duration. The three remaining patients were studied to evaluate chest pain of undetermined cause. Ten patients were on active duty in the Navy, Marine Corps, or Air Force.

EST according to the method of Bruce¹ uses the principle of uninterrupted multistage submaximal and maximal workloads, divided into stages, on a treadmill (Table I).² There is a linear increase in oxygen consumption as the patient progresses through the consecutive stages, from 1 to 4. The patient may advance through seven stages at three-minute intervals with increasing speed and grade of walking or running, until a predetermined heart rate is achieved (submaximal EST) or until a self-determined end point of limiting symptoms occurs (maximal EST). The EST is also terminated if untoward signs, symptoms, or electrocardiographic changes are detected by the physician administering the test. Only the most thoroughly trained athlete will complete all seven stages. Most patients will discontinue during Stages 3 and 4.

TABLE I.—MULTISTAGE EXERCISE CAPACITY TEST
ACCORDING TO THE METHOD OF BRUCE²

Stage (no.)	Speed (mph)	Grade (%)
1st	1.7	10
2nd	2.5	12
3rd	3.4	14
4th	4.2	16
5th	5.0	18
6th	5.5	20
7th	6.0	22

Each Stage is maintained for three minutes. The patient then progresses without interruption to the next stage on the treadmill to provide a continuous period of stress. Total time: 21 minutes; total distance: 1.42 miles.

From Doan, Allen E., Peterson, Donald R., Blackmon, John R., and Bruce, Robert A.: Myocardial ischemia after maximal exercise in healthy men. *Am Heart J* 69:11-21, 1965.

The EST results were considered positive (indicative of CAD) when any electrocardiographic lead showed ST segment depression beyond the J point, whether horizontal or down sloping, of 1.0 mm (0.1 mv) or more after exertion compared with the resting pre-exercise EKG. During the period of exercise lead V₄ or V₅ was monitored. After exercise, leads V₄-V₆ and the limb leads were recorded at two-minute intervals. Twelve of the 25 patients had a resting EKG which was completely normal. The remaining 13 patients had varying degrees of stable repolarization abnormalities, or evidence of previous transmural myocardial infarction on their resting EKG, or both.

Catheterization of the right and left heart was accomplished in the conventional manner and included left ventriculography. SCA was performed using the Sones' or the Judkins' technique. All coronary arteriograms were reviewed by several members of the Cardiology staff and the location and degree of coronary obstruction were determined. The degree of stenosis of the most seriously compromised portion of each coronary artery was then graded (Table II).³ In order to quantify the extent of disease in the coronary arteries of each patient a Coronary Obstruction Index (COI) was used.³ The individual lesions were graded as shown in Table II and then summated. The COI for each patient equaled *twice* the maximal degree of obstruction of the left main coronary artery (LMCA), plus the maximal degree of obstruction of the left anterior descending coronary artery (LAD), circumflex coronary artery (CA), and right coronary artery (RCA).

TABLE II.—GRADING THE DEGREE OF STENOSIS
OF A SINGLE CORONARY ARTERY³

Grade (no.)	Maximal Stenosis (%)
0	None
1	< 25
2	≥ 25 < 50
3	≥ 50 < 75
4	≥ 75 < 100
5	Occlusion

From FitzGibbon, G.M., Burggraf, G.W., Groves, T.D., and Parker, J.O.: A Double Master's Two-Step Test: Clinical, Angiographic and Hemodynamic Correlations. *Ann Intern Med* 74:509-517, 1971.

Results

Table III shows the EST results and SCA findings in the 25 patients with CAD arteriographically

TABLE III.—EXERCISE STRESS TESTING RESULTS AND SELECTIVE CORONARY ARTERIOGRAPHY FINDINGS
IN 25 PATIENTS WITH ARTERIOGRAPHICALLY DEMONSTRATED CORONARY ARTERY DISEASE

Patient (no.)	Age (years)	Sex	Peak heart rate	%MPHR for age	Stage reached* (no.)	ST segment depression (mm)	Angina pectoris with EST	LVEDP	LMCA	LAD	CA	RCA	COI
1	48	M	115	65	½	—	yes	7	—	4	3	5	12
2	44	M	167	92	4	1.5	yes	10	—	4	—	3	7
3	57	M	120	70	½	1.5	yes	6	4	3	—	2	13
4	41	M	140	77	1	—	yes	10	—	3	—	5	8
5	28	M	180	95	2	2.0	yes	8	3	4	5	3	18
6	31	M	160	85	2	3.0	—	9	—	2	5	4	11
7	33	M	167	88	3	4.0	—	10	—	5	—	2	7
8	31	M	150	79	3	1.0	yes	11	—	3	4	4	11
9	44	M	110	60	2	1.5	yes	16	—	4	3	4	11
10	41	M	150	83	4	6.0	yes	9	—	2	5	2	9
11	42	M	140	77	1	—	yes	14	—	5	—	—	5
12	37	M	160	86	3	3.0	yes	14	—	4	4	3	11
13	54	M	115	66	2	—	—	12	—	—	4	4	8
14	46	M	195	109	4	—	—	10	—	1	4	1	6
15	54	M	135	79	1	2.0	yes	16	—	4	5	1	10
16	39	M	130	70	1	—	yes	7	—	4	4	—	8
17	45	M	160	90	2	2.0	yes	10	—	5	3	4	12
18	39	M	140	76	2	4.0	yes	13	—	4	5	4	13
19	37	M	160	87	2	1.0	yes	15	—	3	5	5	13
20	45	M	100	55	1	—	yes	18	—	1	—	4	5
21	49	F	155	89	2	—	—	12	—	4	3	—	7
22	37	M	150	81	1	—	yes	10	—	3	3	2	8
23	32	M	167	89	4	—	—	12	—	4	3	3	10
24	51	M	150	85	1	1.0	yes	10	—	4	4	5	13
25	52	M	125	71	2	2.0	yes	16	—	3	4	5	12

*Stage ½ was arbitrarily defined as a treadmill speed less than 1.7 mph, or a grade less than 10%, or both (see Table I).

%MPHR: Percent of maximal predicted heart rate for age.

LVEDP: Left ventricular end-diastolic pressure.

LMCA: Left main coronary artery.

LAD: Left anterior descending coronary artery.

CA: Circumflex coronary artery.

RCA: Right coronary artery.

COI: Coronary obstruction index which equals twice the degree of maximal obstruction of the LMCA plus the degree of maximal obstruction of the LAD, CA, and RCA as defined in the grading system in Table II.

demonstrated. If greater than 50% narrowing (COI of 3 or more) is accepted to define significant obstruction of a coronary artery, ten of the 23 patients who had no involvement of the LMCA had three-vessel disease (LAD, CA, and RCA) and 18 had at least two-vessel disease. These findings support the concept that CAD is a diffuse process generally, rather than a disease

which provides significant narrowing of only one major coronary artery.⁵

In Table IV is seen a correlation of positive and negative EST results and COI. The EST results are subdivided into maximal stage reached, mean COI for each stage, mean maximal heart rate for each stage, and mean percent of maximal predicted heart rate

(%MPHR) for age for each stage. The maximal predicted heart rate for age was obtained from the study performed by Sid Robinson in 1938.⁶ The ratio of maximal heart rate achieved, to maximal predicted heart rate for age x 100 provided the %MPHR. The 15 patients with a positive EST had a mean COI of 11.4 while the ten patients with a negative EST had a mean COI of 7.7 even though the maximal heart rate and %MPHR were similar in each group.

Discussion

The two main uses of EST are to screen patients for whom the diagnosis of CAD is being considered and to estimate the adequacy of myocardial perfusion during stress in patients with proven coronary atherosclerosis. It is with the latter role that we have concerned ourselves in this study. However, information gained in evaluating EST as an index of coronary arterial flow inevitably also provides insight into EST as a screening procedure.

Twenty-five patients with arteriographically documented CAD were selected in whom EST had been performed just prior to cardiac catheterization and SCA. The EST selected was the multistage treadmill test according to the method of Bruce.¹ Although the double Master's "two-step" has gained wide acceptance because of its simplicity and requirement of minimal equipment, it does not allow the clinician the spectrum of well-controlled and maximal test loads characteristic of uninterrupted multistage treadmill testing. Indeed, Doan et al.² found multistage treadmill testing to be nine times as sensitive as the double Master's "two-step" in a group of patients who underwent both testing procedures.

The sensitivity of the 25 EST procedures as an indicator of significant CAD improved at greater test loads (Table IV). Sixty percent of those patients with arteriographically demonstrated significant coronary atherosclerosis manifested positive EST results. However, if the negative responders who failed to reach Stage 2 are eliminated (inadequate stress) 79% of the group had a positive EST. Perhaps even more significant is the fact that 94% (15/16) of patients with symptomatic CAD demonstrated a positive EST, when negative responders who failed to achieve 90% of their MPHR are eliminated (Table III). If EST is considered adequate only when positive test results, or attainment of 90% MPHR are accomplished, then a group of patients remains in whom EST is inadequate and in whom the results are inconclusive. Six of the ten negative responders in this study manifested angina pectoris which precipitated the termination of the EST prematurely. An additional

TABLE IV.—CORRELATION OF EXERCISE STRESS TESTING RESULTS AND EXTENT OF CORONARY ARTERY DISEASE AS DEFINED BY THE CORONARY OBSTRUCTION INDEX (COI) IN 25 PATIENTS WITH ARTERIOGRAPHICALLY DEMONSTRATED CORONARY ARTERY DISEASE

15 Patients with Positive EST Results					
Mean COI: 11.4					
Mean heart rate: 142 beats per min.					
Mean %MPHR: 82%					
	Stage				
	½*	1	2	3	4
Number (pts.)	1	2	7	3	2
Mean COI	13.0	11.5	12.9	9.7	8.0
Mean heart rate (beats per min.)	120	143	148	159	159
Mean %MPHR	70	82	81	84	88%

10 Patients with Negative EST Results					
Mean COI: 7.7					
Mean heart rate: 141 beats per min.					
Mean %MPHR: 78%					
	Stage				
	½*	1	2	3	4
Number (pts.)	1	5	2	—	2
Mean COI	12.0	6.8	7.5	—	8.0
Mean heart rate (beats per min.)	115	132	135	—	181
Mean %MPHR	65	72	78	—	99%

*Stage ½ arbitrarily defined as a treadmill speed less than 1.7 mph, or a grade less than 10%, or both. (See Table I).

patient stopped because of shortness of breath and fatigue. Two negative responders were stopped at 89% MPHR. A single negative responder reached 90% MPHR (109%). Whether the negative responders who failed to reach 90% MPHR would have manifested positive EST results on retesting at higher loads is unknown. Since this study deals only with patients having proven CAD, no comments can be made about the specificity of EST, nor about false positive results. In a study which differed from ours only in that the "two-step" test was used instead of the multistage treadmill test, Gorlin's group⁴ found that 58% of their patients with arteriographically documented CAD had positive responses. Those authors reported that more extensive disease was associated with a greater frequency of a positive "two-step" test.

The mean COI was greater in our patients with a positive EST than with a negative EST, even though all patients had significant coronary atherosclerosis (Table IV). Thus, EST as performed by us demonstrated that a positive test was indicative of more extensive coronary atherosclerosis than a negative test. However, in the group of 15 patients with a positive EST, the extent of disease was inversely related to the maximal stage reached and the %MPHR.

Conclusions

1) This study confirms the clinical impression that multistage EKG stress testing is a useful means of evaluating patients with symptomatic Coronary Artery Disease.

2) The sensitivity of Exercise Stress Testing is increased as stress is increased.

3) If a patient fails to attain Stage 2 and is a negative responder, the EST is of little value in assessing absence of significant coronary atherosclerosis. Inability to attain Stage 2 could be caused by poor myocardial function, poor physical conditioning, noncardiac physical disability, or psychogenic factors. The selection of 90% MPHR as the minimal requirement for negative responders provided a sensitivity of 94% for EST in the group of patients in this study.

4) Less severe degrees of symptomatic CAD than are presented by most advanced stages, generally require augmented stress to produce a positive EST. Since only symptomatic patients were studied, the value of EST in the detection of coronary atherosclerosis in asymptomatic persons cannot be appraised from this study.

Summary

Twenty-five patients, in whom significant Coronary Artery Disease (CAD) was subsequently documented arteriographically, underwent multistage treadmill testing immediately prior to cardiac catheterization. The results of the exercise tests, compared with the findings of selective coronary arteriography, indicated that exercise testing is a useful index of the presence and extent of significant Coronary Artery Disease.

Ninety-four percent of patients with CAD who could be adequately stressed by treadmill testing demonstrated positive results of the exercise test. In a small number of patients it was difficult to achieve adequate exercise and thereby induce positive Exercise Stress Test results.

REFERENCES

1. Bruce RA and Hornsten TR: Exercise stress testing in evaluation of patients with ischemic heart disease. *Progr Cardiovasc Dis* 11:371-390, 1969.
2. Doan AE, Peterson DR, Blackmon JR and Bruce RA: Myocardial ischemia after maximal exercise in healthy men. A method for detecting potential coronary heart disease? *Am Heart J* 69:11-21, 1965.
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4. Most AS, Kemp HG and Gorlin R: Postexercise electrocardiography in patients with arteriographically documented coronary artery disease. *Ann Intern Med* 71:1043-1049, 1969.
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6. Robinson S: Experimental studies of physical fitness in relation to age. *Arbeitsphysiol* 10:251-323, 1938.

NAVY LODGES

There are over 50 Navy lodges across the U.S. and overseas. Active duty and retired Navymen and their families are eligible to stay at these low-cost units, either en route to a new duty station, or while on vacation.

Their low rates make them easy for all personnel to take advantage of them, and their contemporary design make them appealing to members of Navy families that request their use.—NAVNEWS, Washington, D.C.



To the Editor: I read with interest the paper entitled, "Hepatorenal Syndrome" by LCDR Kirchner which appeared in the May issue of U.S. NAVY MEDICINE. Dr. Kirchner succinctly and correctly distinguished the myriad causes of coincidental liver and renal failure. However, his discussion of the so-called hepatorenal syndrome, I believe, leaves the reader with some wrong impressions.

First, chronic cirrhosis is not the only situation in which this syndrome occurs. Acute fulminant hepatitis has been associated with renal failure. Furthermore, hyponatremia and hypochloremia are not consistent findings but are more often catrogenic, i.e., exogenous free water administration in a patient who cannot handle a water load. One of the hallmarks is the disproportionate rise in BUN and creatinine exceeding the usual 15 to 1 ratio.

The pathogenesis of the syndrome appears to be the crux of the therapy. It is generally accepted by nephrologists (although not by hepatologists) that the prime functional derangement is a decrease in effective circulating blood volume (splanchnic pooling?) with resultant decrease in renal blood flow and a disproportionate decrease in superficial cortical blood flow and, therefore, whole kidney glomerular filtration rate. This has been demonstrated even in the non-azotemic, compensated cirrhotic although to a lesser degree. This stimulus leads to renin release, avid proximal tubular sodium, water and urea reabsorption, and oliguria with a concentrated (volume-mediated ADH release), salt-free (avid proximal reabsorption and aldosterone) urine.

It seems clear then, that rather than restricting salt and water thereby depleting volume further, an attempt should be made to expand plasma volume with albumin, blood or isotonic salt (apparent heresy in an edematous patient).

SELECTED REFERENCES

(1) Kew, et. al.: *Lancet*, 2:504, 1971.

(2) Valahevcic, et. al.: *New England Journal of Medicine*, 272:387, 1965.

(3) McCloy, et. al.: *Gastroenterology*, 53:229, 1967.

(4) Tristiani and Cohn: *Journal of Clinical Investigation*, 46:1894, 1967.

LCDR Richard F. Cioffi, MC, USNR
Head, Renal Branch, Naval Hospital,
NNMC, Bethesda, Md.

We referred Dr. Cioffi's letter to Dr. Kirchner for further comment, and his reply follows.

To the Editor: First I would like to thank Dr. Cioffi for his comments.

It is certainly true that cirrhosis is not the only situation in which the "hepatorenal syndrome" may arise. Actually, in my review article I defined the "hepatorenal syndrome" as one of "spontaneous renal failure associated with severe parenchymal liver disease." This definition includes, of course, fulminant hepatitis. However, my discussion of this syndrome necessarily centered around its occurrence in patients with cirrhosis, since most studies of this situation have been concerned with cirrhotics and very little has been written about renal failure related to other types of liver disease.

Although there is some evidence that there may be a diminished "effective" circulating blood volume in the hepatorenal syndrome, I doubt that this will prove to be the prime functional derangement. If this were so, then one should be able to reverse the renal dysfunction by increasing the circulating blood volume. While attempts to do this by expanding plasma volume with saline solutions, albumin, ascitic fluid, etc. have often resulted in a temporary diuresis they do not seem to have affected the final outcome, and the oliguria has generally returned once the infusions were stopped. In one of the articles referred to by Dr. Cioffi (1), the authors conclude their study by stating

that: "improvement in the renal blood flow by volume expansion or by direct renal vasodilatation and correction of systemic hypotension with the administration of vasoconstrictor agents may restore urine output. Since these patients usually succumb before frank uremia develops, however, correction of the oliguria will probably be of no lasting benefit unless hepatic function also improves."

In another of Dr. Cioffi's references (2), McCloy et al, could demonstrate an improvement in effective renal plasma flow only in those patients with normal or modest impairment of renal function and concluded that "... infusions of albumin or hypertonic sodium chloride are unlikely to be beneficial in the treatment of renal circulatory failure in cirrhosis, since neither substance produced improvement in patients with more severely impaired renal function."

REFERENCES

- (1) Tristiani and Cohn: *J Clin Invest*, 46:1905, 1967.
- (2) McCloy, et al: *Gastroenterology*, 53:237, 1967.

LCDR John P. Kirchner, MC, USNR
Gastroenterology Branch, Medical Service,
Naval Hospital, Philadelphia, Pa.

To the Editor: A week rarely goes by when an article is not seen in the news media concerning a shortage of doctors in the Navy. It appears to be the proper response now-a-days to state that nonprofessional duties will not be required of the doctors, and thus, the Navy Medical Department will be able to meet the increasing daily work loads with fewer doctors.

I think it's safe to say that if medical officers are to be relieved of administrative duties, there will be a greater need for administrators. Yet, I have not heard nor seen any plans to augment the Medical Service Corps which provides the administrators in Navy medicine.

My experience has shown that the average administrator is heavily burdened with duties now. Many Medical Service Corps officers wear "two hats" and in addition, carry five to 20 collateral duties.

Surely, someone has recognized the need for more administrators, and surely some plans are being formulated to recruit more Medical Service Corps officers. I am interested in knowing what is being done in this area. After all, is it not as foolish to utilize a skilled health care administrator for such collateral duties as "physical fitness officer" as it is to utilize a physician, when both are overworked to the point where neither

can efficiently perform his job?

LT W.A. Fregeau, MSC, USN
US Nav Hosp
Subic Bay, R.P.

This letter was referred to our Medical Service Corps Editor, LCDR F.E. Bennett, MSC, USN (Code 352, BUMED), who provided the following reply.

To the Editor: LT W.A. Fregeau's letter concerning an increase in the number and increased utilization of Medical Service Corps officers, with the subsequent decrease in administrative duties required of medical officers, was received at an opportune time. The problems expressed by LT Fregeau are of concern to all Medical Department personnel and we are indeed pleased to be able to report our progress in meeting these problems.

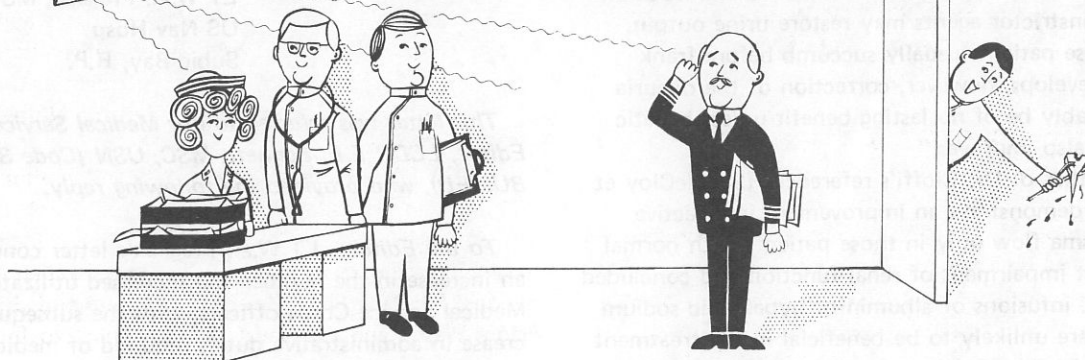
On 1 July 1972 the authorized strength of the Medical Service Corps was increased by over 200 officers, an increase of approximately twelve percent. This fact is particularly noteworthy since most officer communities are being sharply reduced. The major portion of this increase will be for Health Care Administration Section officers in direct support of clinical and professional functions at Navy medical facilities. In addition we are receiving support from the Chief of Naval Operations for additional billets to provide assistants to chiefs of services in the future.

As a result of the Fiscal Year 1973 inservice procurement program the largest number of selectees within the past ten years will be commissioned in August and September. The recently revised minimum requirements for the inservice procurement program will provide additional eligible applicants for the future. A new program was implemented to make applicants with baccalaureate degrees with a major in hospital/health care administration eligible for direct appointment in the U.S. Naval Reserve and we are now realizing input from this source. A proposal has also been forwarded to the Chief of Naval Personnel to make qualified HM2s and DT2s, who possess a baccalaureate degree with a major in business or related areas, eligible for a Reserve commission in the Health Care Administration Section. The decision concerning this proposal should be announced in the near future.

As you can see we are indeed making progress and are pleased to have this opportunity to pass the word.

LCDR F.E. Bennett, MSC, USN
U.S. NAVY MEDICINE
Contributing Editor, Medical Service Corps

Notes and Announcements



PROMOTION TO CAPTAIN?

Historically several Commanders each year were not considered in the primary zone for selection to Captain because BUPERS was not in receipt of the certified copy of the specialty board's results. Hence they were considered a year late and have to resort to a lengthy procedure for rank adjustment.

The current Secretary of Defense Regulation establishes the criteria for eligibility for selection and promotion of officers of the Medical Corps on active duty. It allows a one-year credit for "certification by one or more specialty boards for officers serving in the rank of Lieutenant Colonel/Commander" toward the 20-year promotion and entry grade credit required for Captain. BUMED Instruction 1500.4E, subject: "Participation in professional board examinations," states that it is the sole responsibility of the candidate to report the result of the specialty board examination. A certified copy of the notification received from the examining agency by the candidate shall be forwarded to BUMED-Code 316 and Chief of Naval Personnel (PERS-B1503) within 48 hours after receipt.

It is suggested that all Commanders ascertain at their local command whether or not a copy of the board's results has been properly forwarded to BUMED and BUPERS. For further information concerning this matter contact LCDR N.E. Denison, MSC, USN, Code 3173, BUMED Autovon 294-4166. 📞

ATROPINE SYRETTES AND AUTOINJECTORS

Over the past years, BUMED has provided a large

supply of atropine in syrette, atropen, tablet and liquid forms, for treatment of effects of anticholinesterase agents.

These materials have been discussed in BUMEDINST 6710.50B, which gives guidelines on stocking levels, reporting, and funding. On 18 April 1972, change 2 to this basic instruction was issued. Reporting is no longer required. More importantly, ships and shore commands must now provide for replacement to maintain adequate and up-to-date stocks. To assist in this process, the following requirements are restated and guidance for obsolescence is provided.

1. Requirements:

- a. 3 Autoinjectors per man
- b. 10 mg per man of atropine in tablet, syrette, autoinjector or 25 cc bottle in backup medical stocks
- c. Total 16 mgm of atropine per man. Overseas shore activities include civilians and dependents for planning purposes.

2. Shelf-life Determination:

- a. All ampules are obsolete and should be destroyed.
- b. Atropine syrettes normally have an 18-year shelf life, unless they are damaged, the contents are discolored, the potency drops below 75%, or if Field Branch BUMED announces a bad lot.
- c. Atropens have a 20-year shelf life.
- d. Cool storage temperatures aid in assuring full shelf life.
- e. Syrettes should only be used by Medical Department personnel for treatment of patients and not as a field first-aid measure. Most of the syrettes in the system are over ten years old and the potency is reducing with time.

f. No more syrettes will be manufactured. They will be replaced with autoinjectors for first-aid use,

and with tablets or 25 cc bottles for medical treatment.

g. Dispose of all needle devices in an approved manner. (Courtesy of CAPT G.W. Werner, MSC, USN; U.S. Naval Unit, Fort Detrick, Md.)

ACHA CREDITS ATTENDANCE AT INTERAGENCY INSTITUTE

The American College of Hospital Administrators recently ruled that attendance at the Interagency Institute for Federal Hospital Executives program could be reflected in a candidate's application for admission, or be recognized as a part of the individual's personal program of continuing education for purposes of advancement with the College. Medical Department officer participants may now reflect their attendance at the Institute under the continuing-education item in the College's requirements for admission and advancement.

CHIEF OF THE DENTAL CORPS



Rear Admiral John P. Arthur, DC, USN, has been appointed Assistant Chief for Dentistry and Chief, Dental Division, Bureau of Medicine and Surgery. He succeeds RADM Edward C. Raffetto, DC, USN, who has retired after more than 36 years of naval service.

Admiral Arthur received his D.M.D. degree from the North Pacific Dental College, Portland Oreg. in 1940 and entered private practice in Albany, Oreg. following graduation. Upon being commissioned a LT(jg) in the Naval Dental Corps in 1941, he was assigned to the Second Marine Division. He also served in the USS

INDIANA (BB-58) and in Korea with the First Marine Division during the Korean conflict. As a result of his service in Korea, he became entitled to wear the Korean Service Medal with five engagement Stars and the Marine Corps Insignia, the Presidential Unit Citation with two Stars, the South Korean Presidential Unit Citation with an Oak Leaf Cluster and the United Nations Medal.

Prior to assuming his new post, RADM Arthur served as Inspector General, Dental and Deputy Chief, Dental Division. His previous assignments have also included duty at Pearl Harbor, Hawaii; the Naval Academy, Annapolis, Md.; the Puget Sound Naval Shipyard, Bremerton, Wash.; and the Naval Dental Clinic, Norfolk, Va.

CAPT MILLER NEW CO AT NAMRU-4

CAPT Robert O. Peckinpugh, MC, USN, the first CO of Naval Medical Research Unit No. 4 (NAMRU-4), where he had served since 1964, has retired from the Navy. He was presented the Navy Meritorious Service Medal at retirement ceremonies held at Great Lakes, Ill., on 27 April.

Relieving CAPT Peckinpugh as Commanding Officer of NAMRU-4, at ceremonies held on the same day, was CAPT Charles H. Miller, MC, USN. CAPT Miller had reported to Great Lakes last September and served as Director, Scientific Dept. at NAMRU-4, prior to assuming command.

Before reporting to Great Lakes, CAPT Miller served as Director, Preventive Medicine Division, BUMED.

AEROSPACE MEDICAL ASSOCIATION AWARDS

Five Navy leaders were honored by their colleagues during the 43rd annual scientific meeting of the Aerospace Medical Association at the Americana Hotel, Bal Harbour, Fla. on 11 May 1972, at the Honors Night Banquet.

CAPT R.L. CHRISTY

CAPT Ralph L. Christy, MC, USN received the Louis H. Bauer Founders Award for his many contributions to operational aerospace medicine, including work in acceleration and altitude problems; and the development, evaluation and improvement of anti-blackout and personal protective equipment.

From 1946-1952, CAPT Christy was assigned to the Bureau of Medicine and Surgery (BUMED) and the Office of Naval Research. During that period he had

the principal responsibility for the aeromedical and research requirements, and design details of the human centrifuge for the Naval Air Development Center at Johnsville, Pa. This large centrifuge has been used for many projects, including training of the astronauts and X-15 test pilots.

While assigned to the USS F.D. ROOSEVELT (1952-54), he made important contributions to the protection of flight deck personnel against jet engine noise and to improved flight deck communications. His other assignments include: Director of the Aviation Medicine Technical Division, BUMED; and Head, Neuropsychiatry Branch, BUMED. He has served as Department of Defense representative on the National Mental Health Advisory Council to the National Institute of Mental Health since 1962. Presently, CAPT Christy is the Special Assistant for Medical Dept. Special Projects, Professional Division, BUMED.

Past-president and a Fellow of the Aerospace Medical Association, CAPT Christy is also a Fellow of the American Psychiatric Association, and a member of the American Medical Association, International Academy of Aviation and Space Medicine, Association of Military Surgeons, American College of Preventive Medicine, American Association for the Advancement of Science and the Washington Psychiatric Society.



CAPT Ralph L. Christy, MC, USN

MS. ROSALIE AMBLER

The Raymond F. Longacre Award was presented to Ms. Rosalie Ambler for her outstanding accomplishments in the psychological and psychiatric aspects of aerospace medicine.

Since 1950, Ms. Ambler has worked at the Naval Aerospace Medical Center as a psychologist at the School of Aviation Medicine and as Head of the Aerospace Selection and Training Branch of the Naval Aerospace Medical Institute. She assumed her present position as Chief of the Personnel Research Division in 1970.

Ms. Ambler has conducted research on cognitive function; performance and psychophysiological responses, which contributed to the understanding of flight personnel; and predictive tests which have had major impact on procurement, selection, training, and retention of flight personnel. She participated in the initial development of the Flight Student Prediction System and is responsible for a major expansion of this system, encompassing techniques for improving specialty assignments and training, and for determining criteria of effectiveness.

A Fellow of the American Psychology Association and past president of the West Florida Psychological Association, Ms. Ambler is also a member of the Aerospace Medical Association, the American Association for the Advancement of Science, the Southeastern Psychology Association, and the International Association of Applied Psychology.



Ms. Rosalie Ambler

CAPT M.D. COURTNEY

The Eric Liljencrantz Award was presented to CAPT Marvin D. Courtney, MC, USN for his research in the problems of acceleration and altitude. Serving at the time of the award as CO, Naval Aerospace Medical Institute, CAPT Courtney is now the Force Medical Officer and Senior Flight Surgeon on the staff of Commander, Naval Air Force, Pacific. Previous assignments have included: Deputy Director, Aviation Medical Acceleration Laboratory, Johnsville, Pa.; Director of Aerospace Medicine Technical Division, BUMED, Washington, D.C., and Assistant for Aerospace Medicine to the Deputy Chief of Naval Operations for Air.

CAPT Courtney had a significant role in the development of the Navy's full pressure suit; in establishing the centrifuge at Johnsville, Pa., as a dynamic flight simulator by uniting the centrifuge and computer; and in developing protective equipment and training practices which contributed to the safety of aircrews.

A Fellow of the Aerospace Medical Association, CAPT Courtney is also a member of the American Medical Association, the Association of Military Surgeons, and the U.S. Naval Institute.



CAPT Marvin D. Courtney, MC, USN

J.P. POLLARD, M.D.

CAPT Joseph P. Pollard, MC, USN (Ret.), received the Theodore C. Lyster Award for outstanding achievement in the general field of Aerospace Medicine.

Presently Director, Biological and Medical Sciences Division, Office of Naval Research in Arlington, Va., Dr. Pollard retired from active duty in the Navy in Dec 1967. From 1949 to 1953, he was the Navy Staff Member of the Committee on Medical Sciences, Research and Development Board, Office of the Secretary of Defense. His other assignments included: Staff Medical Officer with the Sixth Fleet; Head of Aviation Medical Research at BUMED and at the Naval Research Institute. He organized the Naval Bioastronautics program. As Director of the Research Division (1964-67) and as Assistant Chief of the Bureau for Research and Military Medical Specialties (1967), Dr. Pollard established a progressive and effective Navy medical research and development program and a project officer system for management of the research programs.

A Fellow of the Aerospace Medical Association and the American College of Preventive Medicine, CAPT Pollard is also a Diplomate of the American Board of Preventive Medicine (Aviation Medicine), and a member of the International Academy of Aviation and Space Medicine.



CAPT Joseph P. Pollard, MC, USN (Ret.)

H.J. VON BECKH, M.D.

The Arnold D. Tuttle Award was presented to Harold J. von Beckh, M.D., for his research on weightlessness and decompression, and for the development of the "multi-directional" G protection concept. He is presently the Director of Medical Research, Crew Systems Dept., Naval Air Development Center, Warminster, Pa.

Dr. von Beckh directed the airborne weightlessness program, experiments in acceleration, and development of protective equipment. He contributed to the Man-high Project, primate program for Project Mercury and Project Apollo, the biodynamic assessment of human tolerance to abrupt deceleration, and effects of exposure to hazardous mission environments.

Dr. von Beckh is a Fellow of the Aerospace Medical Association, the British Interplanetary Society, and the New Mexico Academy of Sciences; an Associate Fellow of the American Institute of Aeronautics and Astronautics; a member of the American Rocket Society; and an honorary member of the Hermann Oberath Society, Medical Association of the Armed Forces of Argentina, Center of Astronautical Studies of Portugal, Spanish Society of Aerospace Medicine, and Austrian Astronautical Society. He is the author of a textbook, *Physiology of Flight*, and numerous articles.



Harold J. von Beckh, M.D.

1972 FELLOWS

Among the 1972 Fellows of the Aerospace Medical Association were the following Navy personnel:

CAPT Robert D. Workman, MC, USN

CAPT M. Gil Webb, MC, USN

CAPT Earl H. Ninow, MC, USN, and

CAPT Glenn F. Kelly, MC, USN

RADIOLOGIST WINS BELLY BOARD AWARD

The fifth annual Belly Board Award, which consists of a gold plaque on a wooden background, was presented to LCDR Robert H. Magen, MC, USN at Bethesda Naval Hospital on 9 June 1972 by CAPT William M. Lukash, MC, USN, Head of the Gastroenterology Clinic and Research Branch. Dr. Magen is the first radiologist to receive this award which is presented to that individual who has made the most significant contribution to teaching and research programs in Gastroenterology at the National Naval Medical Center in Bethesda. Previous winners have all been members of the surgical staff. Dr. Magen is a graduate of the University of Pennsylvania where he also received his training in radiology. Although assigned as a staff radiologist at Bethesda, he has shown special interest by his active participation in the weekly Belly Board Conference moderated by Dr. Raymond B. Johnson, where difficult patients are presented not only for their teaching interest, but also for the combined clinical recommendations of the consulting specialists.

The award was presented during a two-day gastroenterology symposium combined with the surgical department, at Bethesda. The visiting guest professor was Dr. Joseph B. Kirsner, Professor of Medicine, Chief of Staff, and Deputy Dean of the University of Chicago Medical School. In addition, Dr. Judson C. Randolph, surgeon and Chief at the Children's Hospital of the District of Columbia and Dr. J. Richard Thistlethwaite, Associate Clinical Professor of Surgery at the George Washington University in Washington, D.C. were active participants in this two-day program. The two days included active teaching rounds, the Belly Board meeting, selected sessions on inflammatory bowel disease and unusual cases of peptic ulcer, followed by the Grand Rounds presentation by Dr. Kirsner of "Immunologic Aspects of Inflammatory Bowel Disease."

ANESTHESIA SYMPOSIUM

The Department of Anesthesiology at the Naval Hospital, Portsmouth, Va. is sponsoring its Third Annual Anesthesia Symposium on September 7 and 8, 1972. The symposium is a refresher course directed towards the continuing education of physician anesthesiologists.

Additional information can be obtained from CDR W.M. McDermott, Jr., MC, USN, Chief of Anesthesiology Service, Naval Hospital, Portsmouth, Va. 23708. — PAO, Naval Regional Medical Center, Portsmouth, Va. 23708.

SEMINARS ON LEPROSY

The below listed two-day and three-day seminars for 1972-73, have been scheduled by the Department of Health, Education, and Welfare, Public Health Service, at the U.S. Public Health Service Hospital, Carville, Louisiana 70721.

Leprosy — Dermatological Aspects 3-5 October 1972
(Senior Residents in Dermatology) 7-9 November 1972

9-11 January 1973

13-15 March 1973

15-17 May 1973

(Military Dermatologists) 17-19 October 1972

Leprosy — Pathological Aspects 24-26 January 1973

Leprosy — Neurological Aspects 14-15 February 1973

Leprosy — Ophthalmological Aspects 28-29 March 1973

There are no registration fees or other costs assessed for any of these seminars. Lodging and meals for those attending will be provided on the Station. Commissioned Officers who are receiving per diem will be charged the standard rate of \$1.50 per meal.

Transportation to and from the originating point to the New Orleans International Airport is the responsibility of those attending the seminar. The hospital will furnish transportation between the New Orleans International Airport and Carville, a distance of 67 miles.

Further information can be obtained from: Chief, Training Branch, U.S. Public Health Service Hospital, Carville, Louisiana 70721.

ANNUAL AMSUS MEETING

The Association of Military Surgeons of the United States (AMSUS) will hold their 79th annual convention in the convention center at San Antonio, Tex., from December 10 through December 13, 1972. This is the first time since 1949 that the yearly meeting has been held outside of the Washington, D.C., area.

The Keynote address will be delivered by the Honorable Richard S. Wilbur, Assistant Secretary of Defense for Health and Environment. The William C. Porter Lecture will be delivered Wednesday morning, December the 13th, by Dr. Norman Q. Brill of UCLA.

During the convention, many facets of medical services will be discussed. There will be individual related sections for the various professional members of the AMSUS including dentists, Medical Service Corps officers, scientific programs, chapters' section, veterinary sciences, and nursing section.

The Medical Services Corps' main topic of discussion will be "Medical Support Services — A National Resource." The obligation to meet national demands through the medical support services is the closing topic for the three-day convention.

Theme of the Medical Specialists Section will be "Today and Tomorrow: Practice, Training, Research."

"A Strategy for Networking of Nurse Manpower" will be the keynote address for the Nursing Section. Representatives of the Army, Navy, Air Force, Public Health Service and Veterans Administration will discuss the extended roles of nurses.

The Chapters Section will hold its annual meeting on Tuesday, December 12, with COL Anthony A. Borski, MC, USA, presiding. Presentations will be made by each chapter and scientific papers pertinent to medical problems in the regional areas of the chapters will be given.

Scientific papers dealing with support of research will be among those featured during the Veterinary Section meeting Tuesday afternoon.

"Contributions of the Federal Medical Programs to National Health Delivery" will be the topic of the Scientific Program opening Monday afternoon, December 11. The closing presentation on Wednesday morning will be "Current Events in Cardiac Surgery."

The Air National Guard State Air Surgeon/Medical Technician Conference will hold registration Saturday, December 9, and open their program on Sunday. The Reserve Officers' Affairs' Session will be held on Tuesday and Wednesday afternoons.

Among the many topics to be discussed during the dental section of the AMSUS conference are: "Objectives and Philosophy of the new Dental Assistant

Course and New Concepts and Techniques in Fractured Anterior Repair."

The Sustaining Member Lecture will be presented on December 12 by LT COL Basil A. Pruitt, Jr., Commander and Director, United States Army Institute of Surgical Research, Fort Sam Houston, Tex.

To acquaint the ladies attending with one of America's four unique cities, a series of four local tours have been arranged. Other tours will feature a visit to old Mexico and a trip to the LBJ Memorial Library in Austin.

The convention facilities in 250-year old San Antonio are outstanding. Created to be a part of Hemisfair 1968, the meeting rooms and guest areas are comfortable as well as beautiful. Major department stores and handicraft shops are only a few blocks from the hotels and convention center.

Plan to attend. ☘

MEDLINE SEARCH SERVICE AT BETHESDA NAVAL HOSPITAL

On line search of the biomedical literature by computer terminal is now available to Navy personnel. The MEDLINE data base consists of 450,000 citations to articles from 1100 journals indexed from MEDLARS since 1 January 1969.

Consult the National Library of Medicine MEDICAL SUBJECT HEADINGS for appropriate search terms before submitting your request. Please utilize the Medline Search Request Form, a sample of which appears below for your convenience.

Direct your request to: E.R. Stitt Library, Naval Medical Training Institute, National Naval Medical Center, Bethesda, Maryland 20014, ATTN: Rosemary B. Spitzen; or call (202) 295-1184, AUTOVON 8 295-1184.

NNMC-5070/3 (new 5-72)

MEDLINE SEARCH REQUEST

(1) Name of Requester:

(3) Organization, Street Address, City, State & Zip:

(2) Date:

(4) Telephone No.:

(5) Occupation of Requester:

(6) Detailed Statement of Requirements: Please describe, as specifically as possible, the subject matter for which the search is to be conducted. Define any terms that may have special meaning in your request. Also, if there are points not to be included, please state these.

_____ English
_____ All Languages

(7) Pertinent MESH Headings (i.e., those terms under which you have searched Index Medicus) —

(8) Indicate Preference:

_____ Few, very relevant articles

_____ Comprehensive search with possibility of peripheral material

(9) Please list any known relevant citations:

(10) Purpose of Search:

_____ Patient Care
_____ Research
_____ Teaching
_____ Paper/Book
_____ Other (specify) ☘

AMERICAN BOARD CERTIFICATIONS

American Board of Anesthesiology

CDR Richard W. Akin, MC, USN
 CDR Jack R. Collins, MC, USN
 LCDR Jay S. Devore, MC, USN
 LCDR Rex A. Stout, MC, USN
 LCDR John P. Swope, MC, USN
 LCDR Curtis D. Warrington, MC, USNR

American Board of Endodontics

CDR Robert E. Cassidy, DC, USN
 CDR Richard A. Murphy, DC, USN

American Board of Family Practice

LCDR Jeffrey A. Altman, MC, USNR

American Board of Internal Medicine

CAPT Philip J. Dean, MC, USN
 LCDR Edward M. Braun, MC, USN
 LCDR Richard F. Cioffi, MC, USNR
 LCDR Michael W. Kimball, MC, USN

American Board of Neurological Surgery

CDR Alexandre Solomon, MC, USN

American Board of Obstetrics and Gynecology

CDR Robert L. Anderson, MC, USN

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 CDR Peter W. Connoles, DC, USN
 CDR Brice J. DeVos, DC, USN
 CDR William R. Martin, DC, USN
 CDR Thomas E. Stump, DC, USN
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 LCDR Mark A. Cohan, MC, USNR
 LCDR Robert S. Howell, MC, USNR

American Board of Pediatrics

LCDR Stanley Einzig, MC, USNR
 LCDR James M. McClurkan, MC, USN

American Board of Plastic Surgery

CDR Norman R. Wall, MC, USN

American Board of Prosthodontics

CDR Albert R. Hube, DC, USN
 CDR Russell L. Skyberg, DC, USN

American Board of Psychiatry and Neurology

LCDR Edward G. Morhauser, MC, USN
 (Psychiatry)
 LCDR Gerard M. West, MC, USN
 (Psychiatry)

American Board of Radiology

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 LCDR Donald D. Bell, MC, USN
 LCDR Robert S. Cathcart, III, MC, USNR
 LCDR William P. Chalfant, III, MC, USNR
 LCDR Max Savin, MC, USN
 LCDR Earl S. Stewart, MC, USNR
 LCDR Michael E. Williams, MC, USN

American Board of Thoracic Surgery

LCDR Anthony J. Acinapura, MC, USNR

American Board of Urology

CDR William L. Meehan, MC, USN

FIFTY RADM SELECTEES

This year's rear admiral selectees comprise the largest group of Naval officers to be selected to flag rank since World War II. The list of 50 rear admiral selectees includes the first woman to reach flag rank, the youngest man to make flag rank, and the man who is believed to be the second to complete the seaman-to-admiral route.

—NAVNEWS, Washington, D.C.

AWARDS AND HONORS

Distinguished Service Medal

VADM George M. Davis, Jr., MC, USN
 RADM Edward C. Raffetto, DC, USN
 RADM Horace D. Warden, MC, USN
 RADM Joseph L. Yon, MC, USN

Legion of Merit

CAPT Cyril J. Honsik, MC, USN
 CAPT Gordon H. Rovelstad, DC, USN
 CAPT Robert M. Tennille, Jr., MSC, USN

Bronze Star Medal

LT Paul A. Levine, MC, USN

Meritorious Service Medal

RADM Willard P. Arentzen, MC, USN
 CAPT James T. Ashwell, DC, USN
 CAPT Ned B. Curtis, MSC, USN
 CAPT Victor M. Holm, MC, USN
 CAPT Hanns O. Kretschmar, MC, USN
 CDR Lloyd B. Nichols, MSC, USN
 CAPT Robert O. Peckinpugh, MC, USN
 CAPT Donald W. Robinson, MC, USN
 CAPT Charles F. Tedford, MSC, USN

Navy Commendation Medal

LCDR Francis G. Anderson, Jr., MSC, USN
 HM3 Stephen D. Baker, USN
 HMCM John D. Braswell, USN
 CAPT John W. Cox, MC, USN
 HMCS Porter S. Decker, Jr., USN
 HM3 Steven P. Glaser, USN
 HMC Donovan D. Hofer, USN
 LT William G. King, MSC, USN
 HMC Oscar A. La Fontaine-Nieves, USN
 HM3 Kenneth P. Leary, USN
 HMCM Roger E. Lindsay, USN
 HM3 "L" "D" Oliver, Jr., USN
 HM2 David W. Omness, USN
 HN James W. Poindexter, USN
 HM2 Reggie W. Scruggs, USN
 HM3 Kim M. Rosenstrauch, USN
 HM1 David R. Ross, USN
 HM2 Ralph A. Sawyer, USN
 HN Elvis S. Wright, USN

Navy Achievement Medal

LT John E. Bruhn, MSC, USN
 HMC John S. Ferritor, Jr., USN
 HMC George R. Saffield, USN

CELEBRATION IN TAIPEI

A traditional celebration was held in Taipei, Taiwan on the occasion of the 24th Anniversary of the Medical Service Corps in Aug 1971.



Participating in the cake-cutting ceremony were, from left to right: LCDR T.F. Levandowski, Administrative Officer NAMRU-2, Program Chairman; LT H.V. Petersen, Personnel Officer NAMRU-2, junior member of the Corps in Taiwan; RADM H.C. Lu, Navy Surgeon General, Republic of China; BRIG GEN C.J. Douglas, Deputy Commander Taiwan Defense Command, and; CDR F.C. Pittington, Administrative Officer U.S. Naval Hospital Taipei and senior MSC officer in Taiwan.

United States Navy Medicine

CORRESPONDENCE AND CONTRIBUTIONS from the field are welcomed and will be published as space permits, subject to editing and possible abridgment. All material should be submitted to the Editor, U.S. Navy Medicine, Code 18, Bureau of Medicine and Surgery, Washington, D.C. 20390

NOTICES should be received not later than the third day of the month preceding the month of publication.

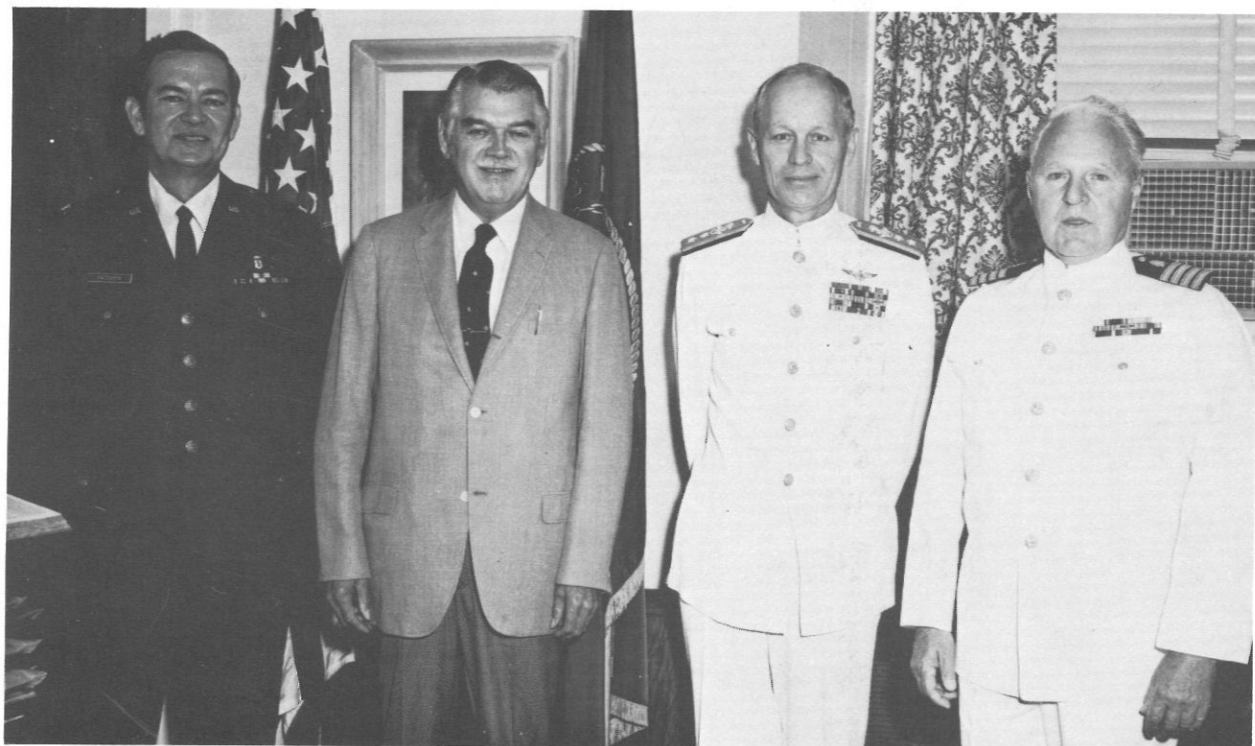
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SUGGESTIONS are invited concerning U.S. Navy Medicine, its content and form.

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Among the participants in the graduation ceremony for 38 dental residents on 16 June at the Naval Graduate Dental School were (from left to right): COL J.M. Patterson, DC, USAF, Office of the USAF Surgeon General; Dr. A.E. Burns, Dean, Graduate School of Arts & Sciences, The George Washington University; RADM B.B. Forbes, Jr., USN, Assistant Chief of Naval Personnel for Personnel Control; and CAPT W.C. Wohlfarth, Jr., CO of the Naval Graduate Dental School at that time. Graduates of the School's first-year residencies in general dentistry and specialties now receive the degree of Master of Science in Special Studies (Oral Biology) from the University.—PAO, NNMC, Bethesda, Md. (Photo by R.M. Oswald)

U.S. NAVY MEDICINE